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F00 BIT OPTIMIZATION PROJECT

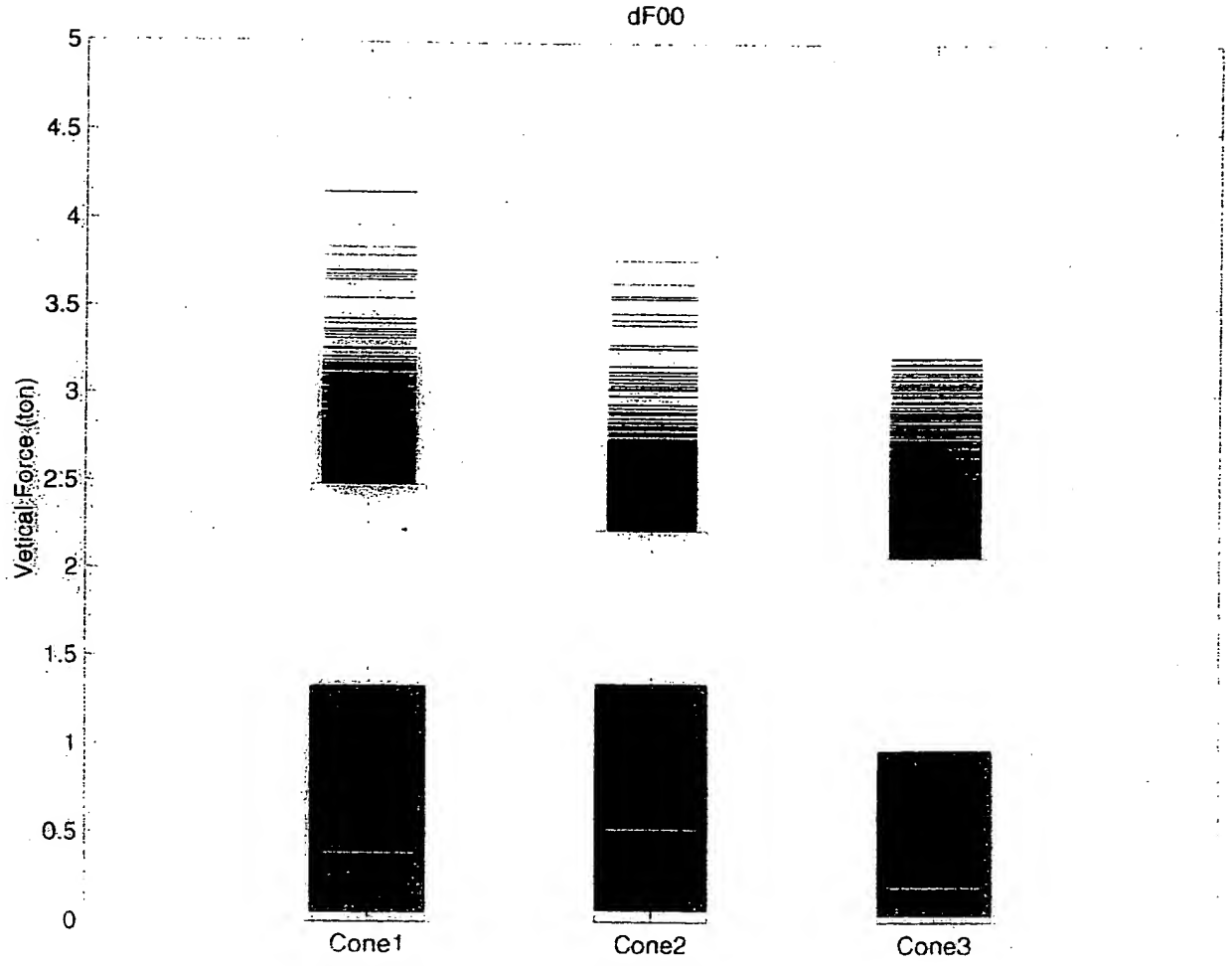
SMITH INTERNATIONAL, INC.

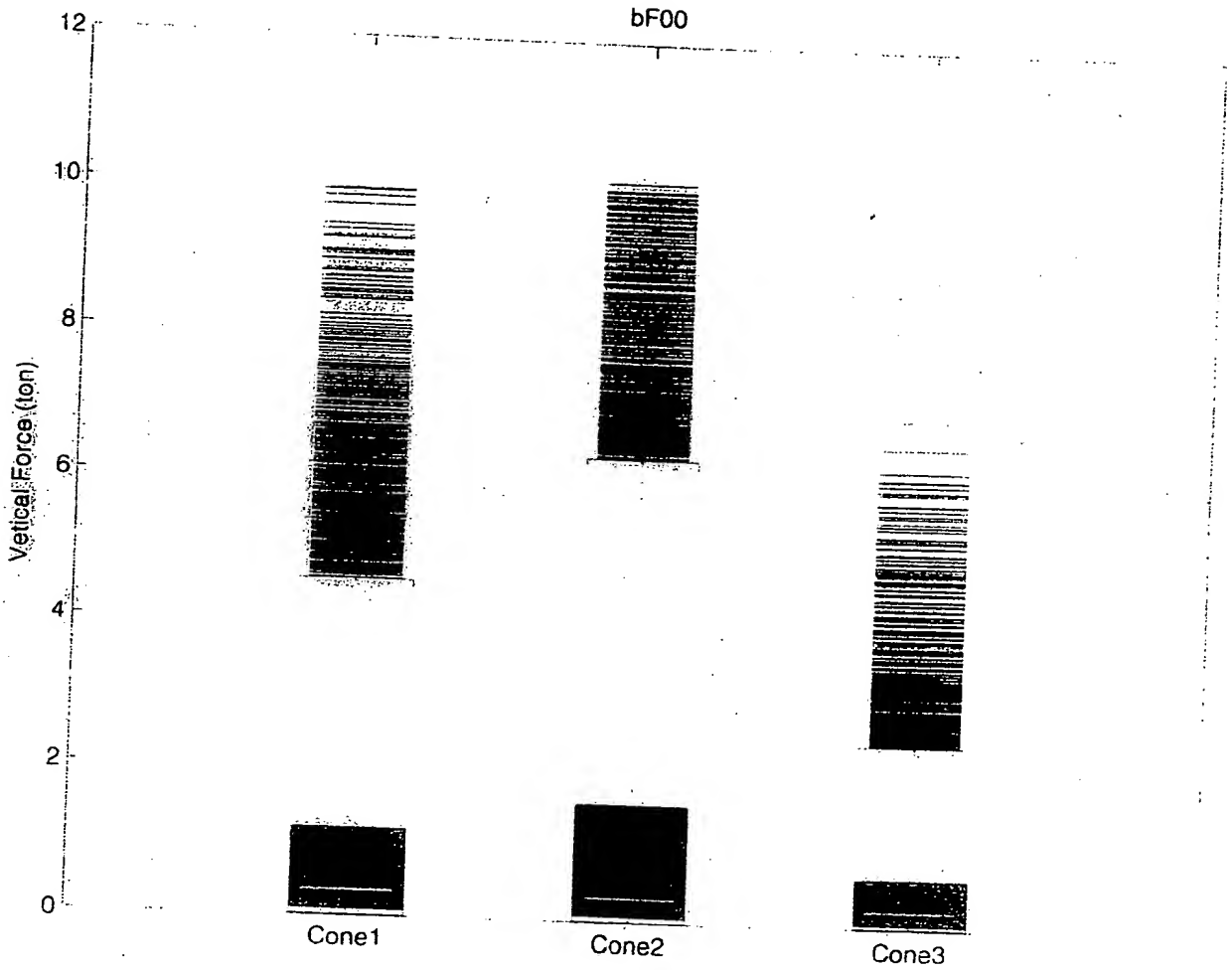
ORCA Insert

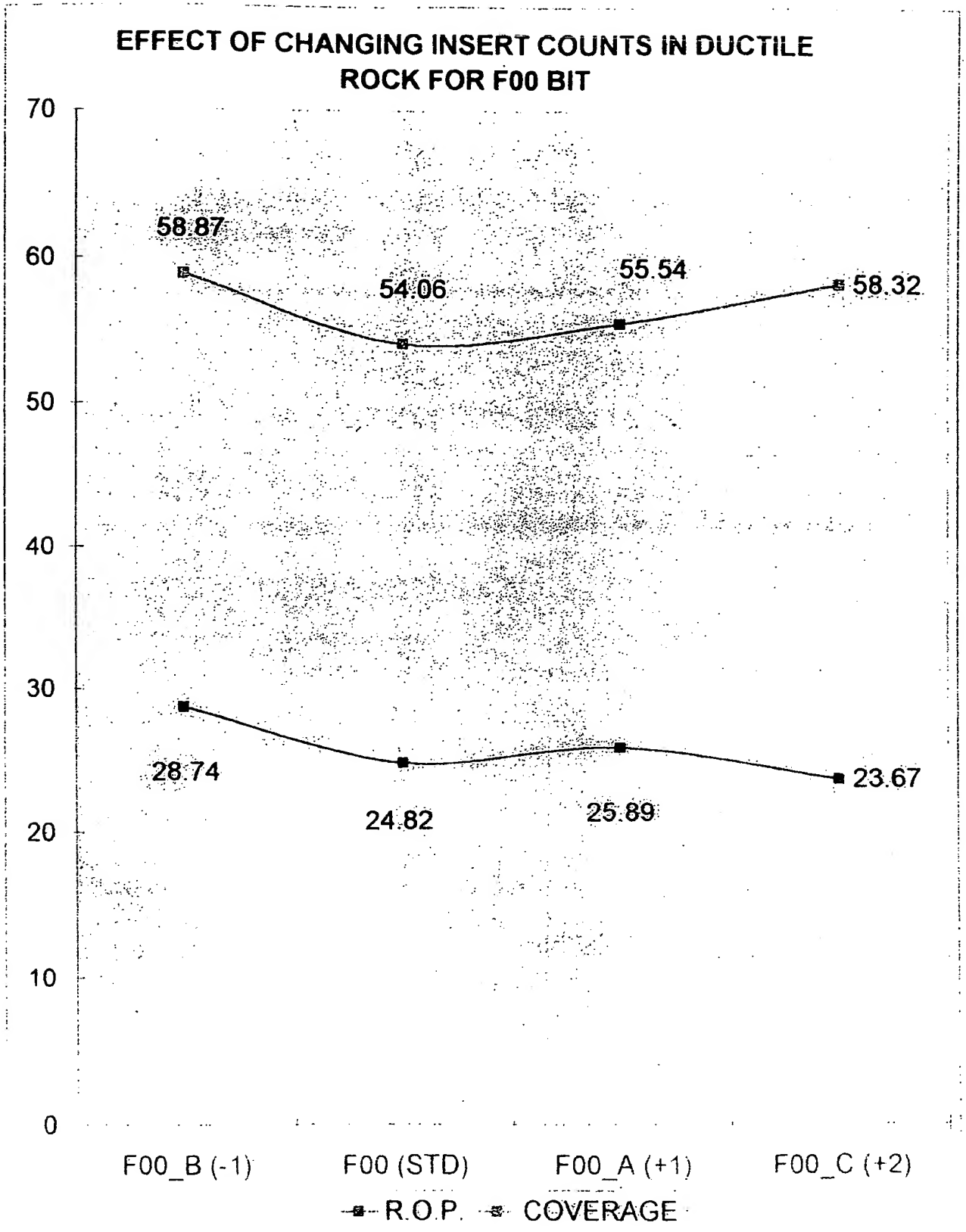
- FEATURES
  - Oblong insert bottom
    - Counter Insert Rotation
    - Improved Strength
  - Rotated and Offset Crest (.680 crest width)
    - Optimized Scraping Action
    - Improved Strength

IDEAS Results

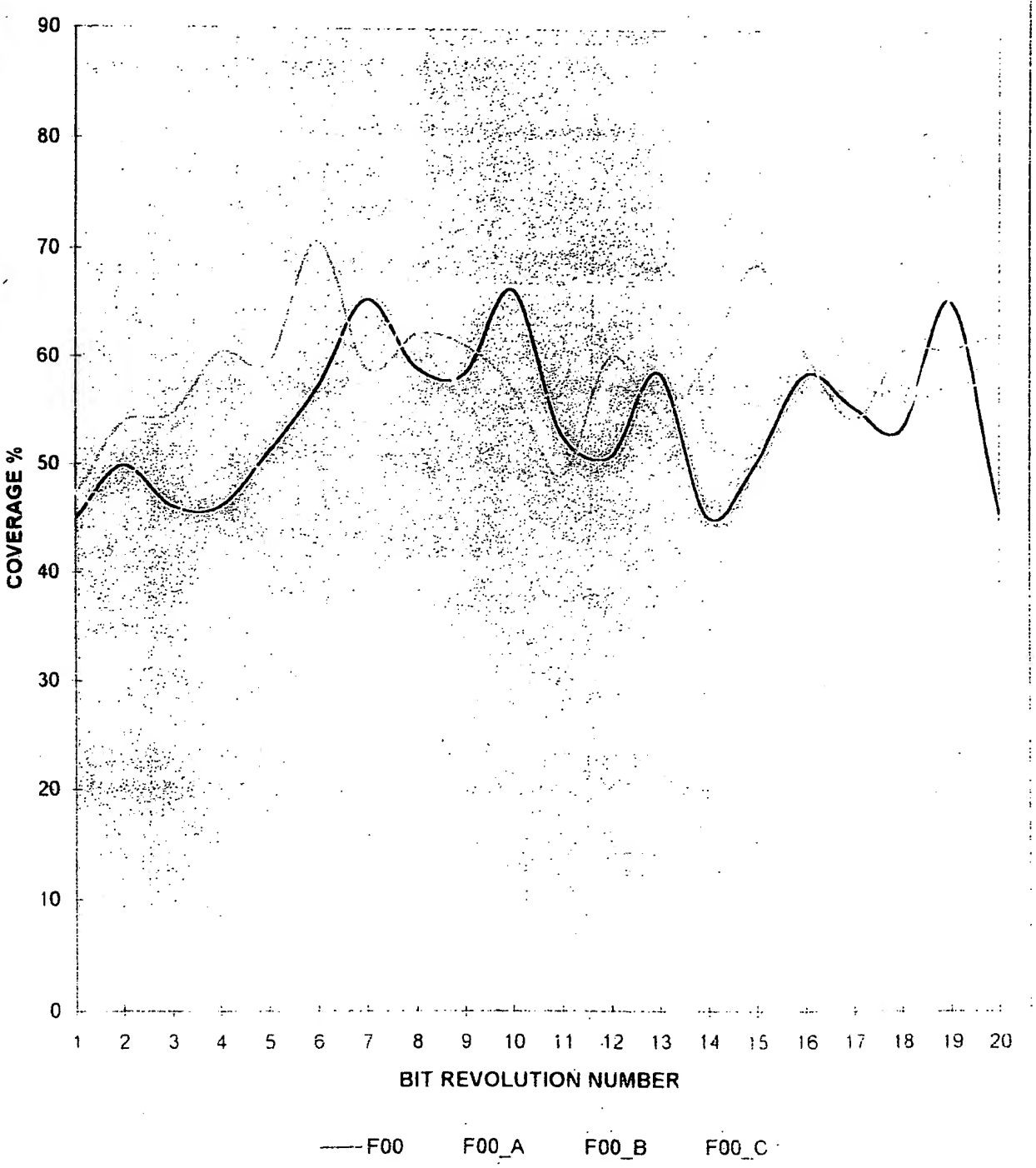
- DUCTILE ROCK
  - R.O.P.=25.47 m/hr (2.6 % higher)
  - COVERAGE=55.14 % (1.6 % lower)
- BRITTLE ROCK
  - R.O.P.=24.45 m/hr (9.3 % lower)
  - COVERAGE=36.70 % (7.3 % lower)

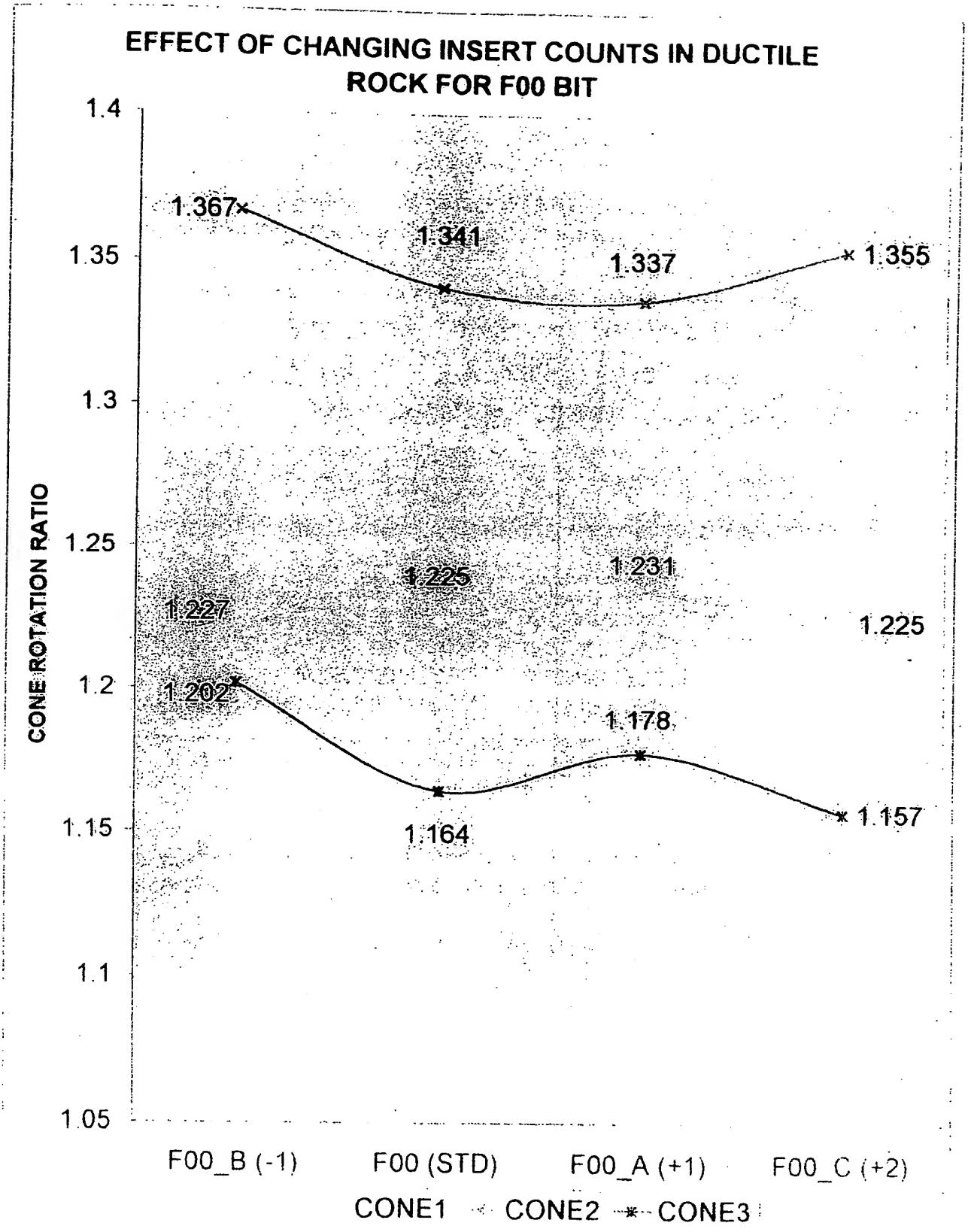

dF00
Vetical Force (ton)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Cone1
Cone2
Cone3

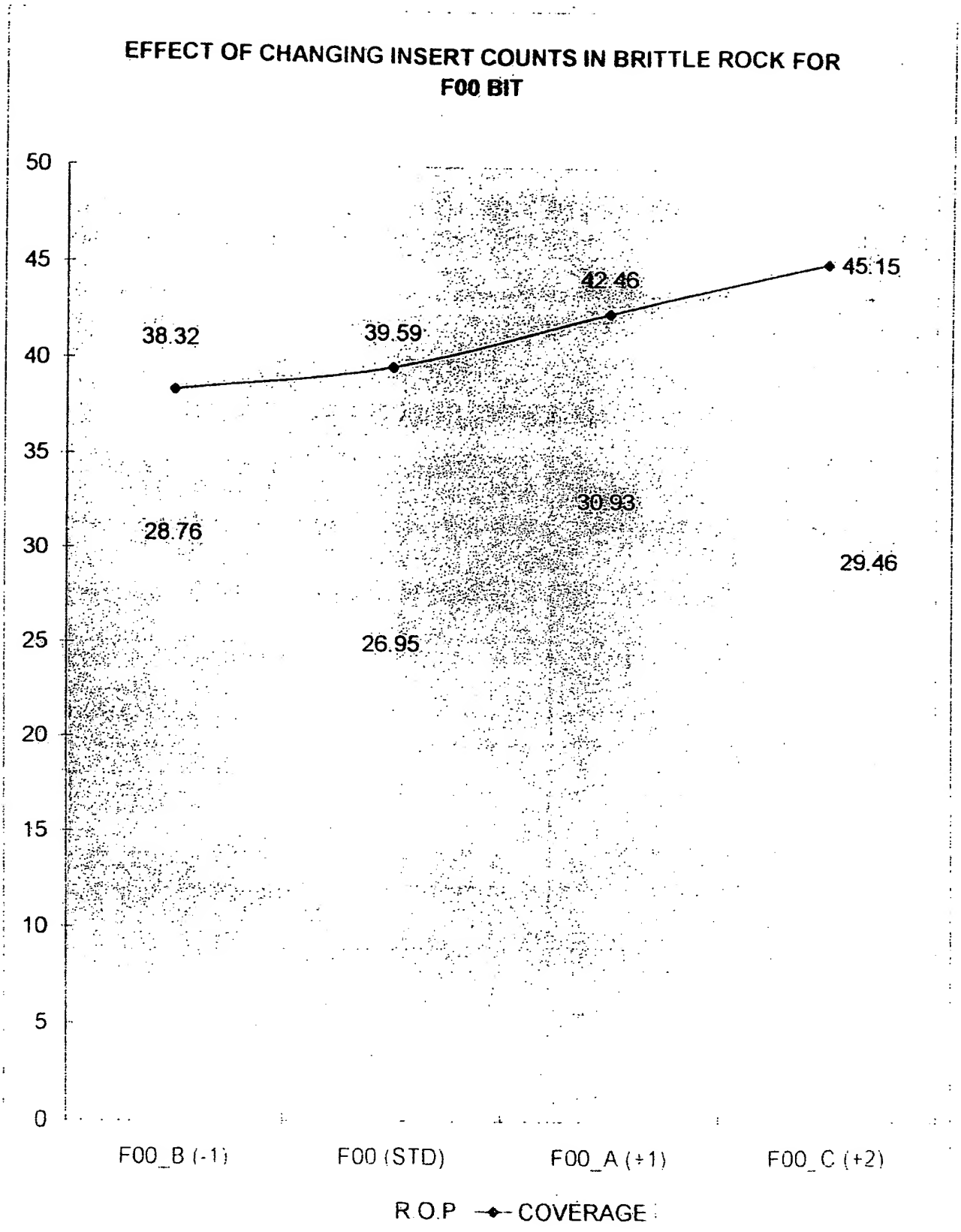

bF00
12
10
8
6
4
2
0
Vetical Force (ton)
Cone1
Cone2
Cone3

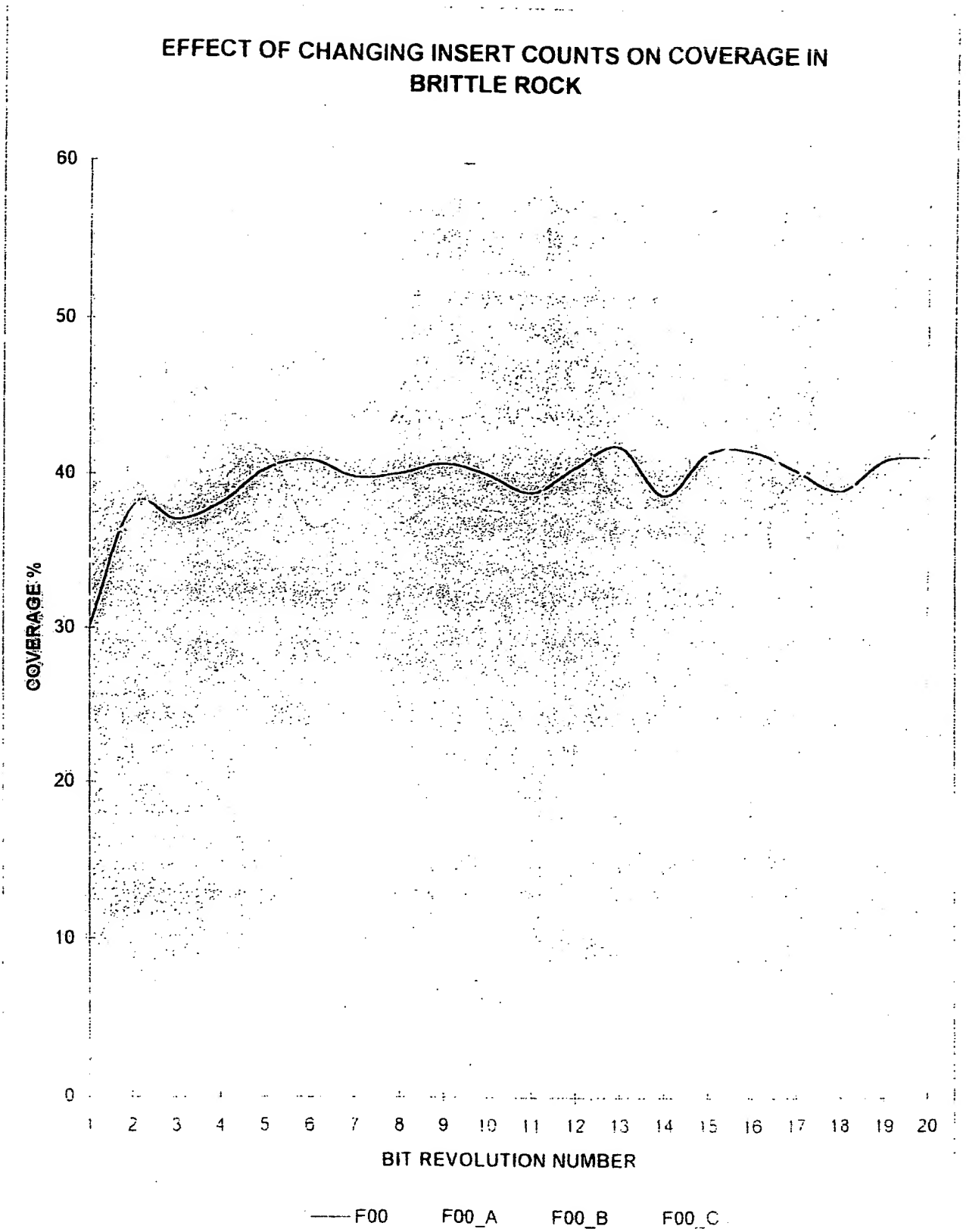

EFFECT OF CHANGING INSERT COUNTS IN DUCTILE ROCK FOR F00 BIT
70
60
50
40
30
20
10
0
58.87
54.06
55.54
58.32
28.74
24.82
25.89
23.67
F00_B (-1)
F00 (STD)
F00_A (+1)
F00_C (+2)
R.O.P.
COVERAGE

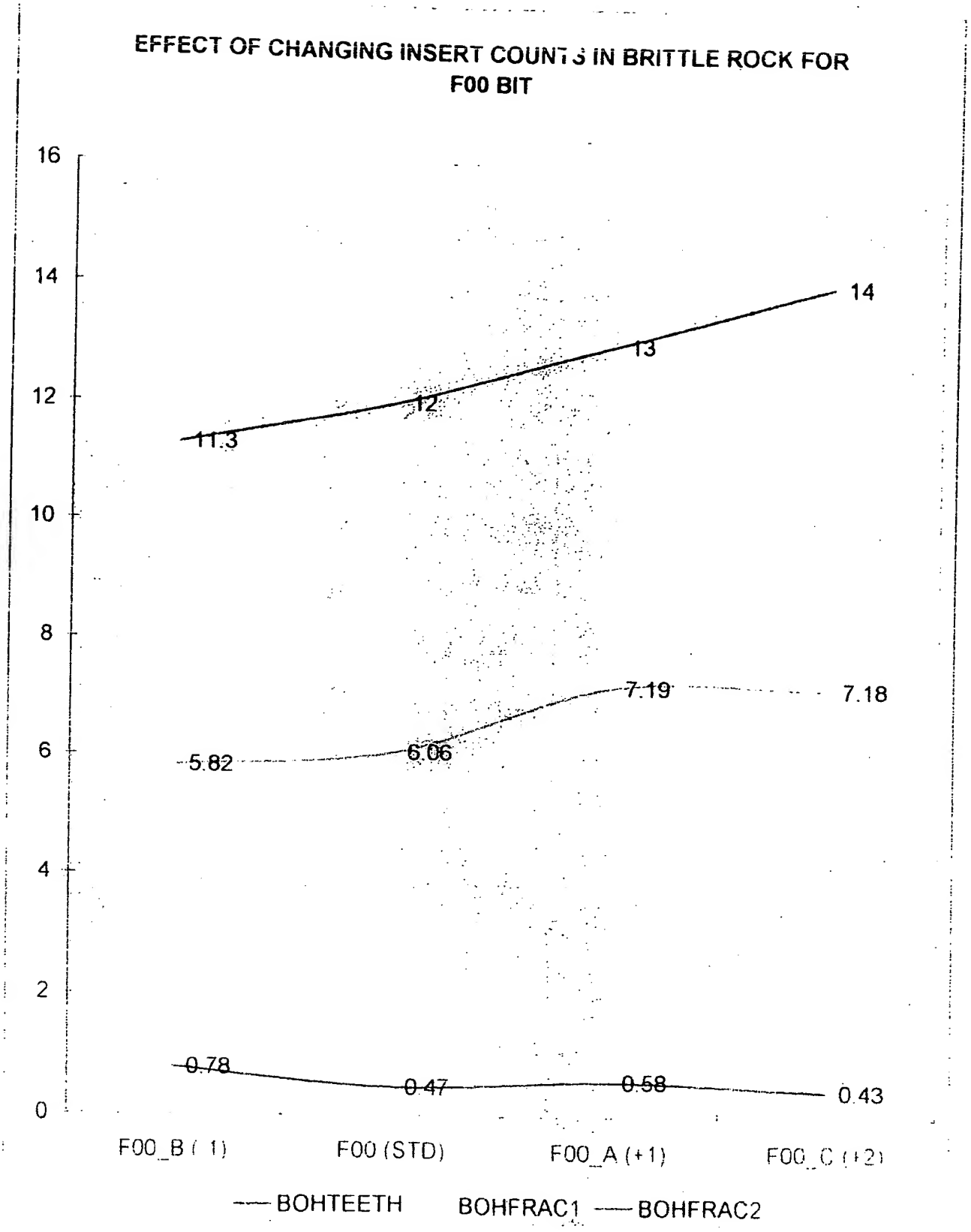
EFFECT OF CHANGING INSERT COUNTS ON COVERAGE IN DUCTILE ROCK

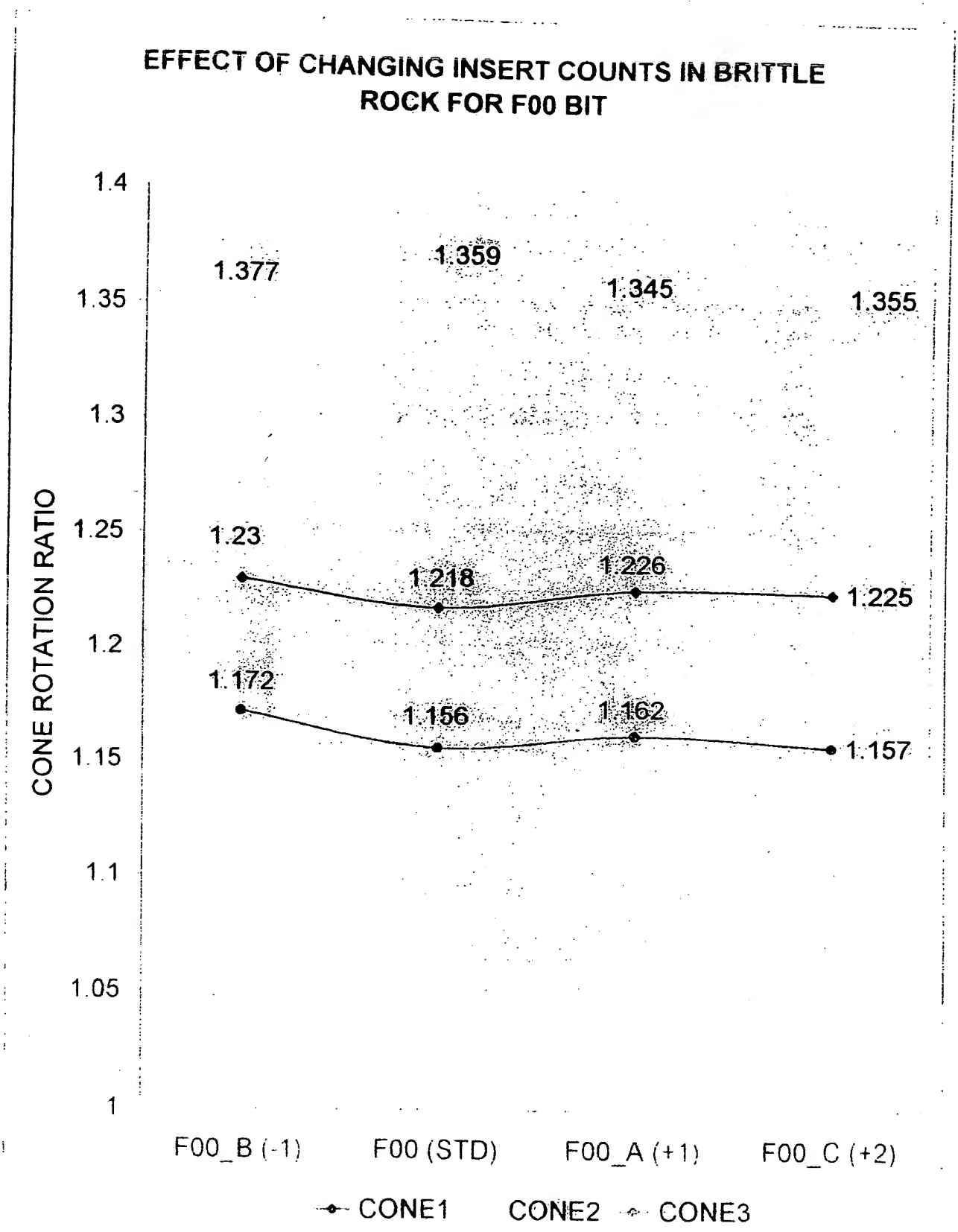


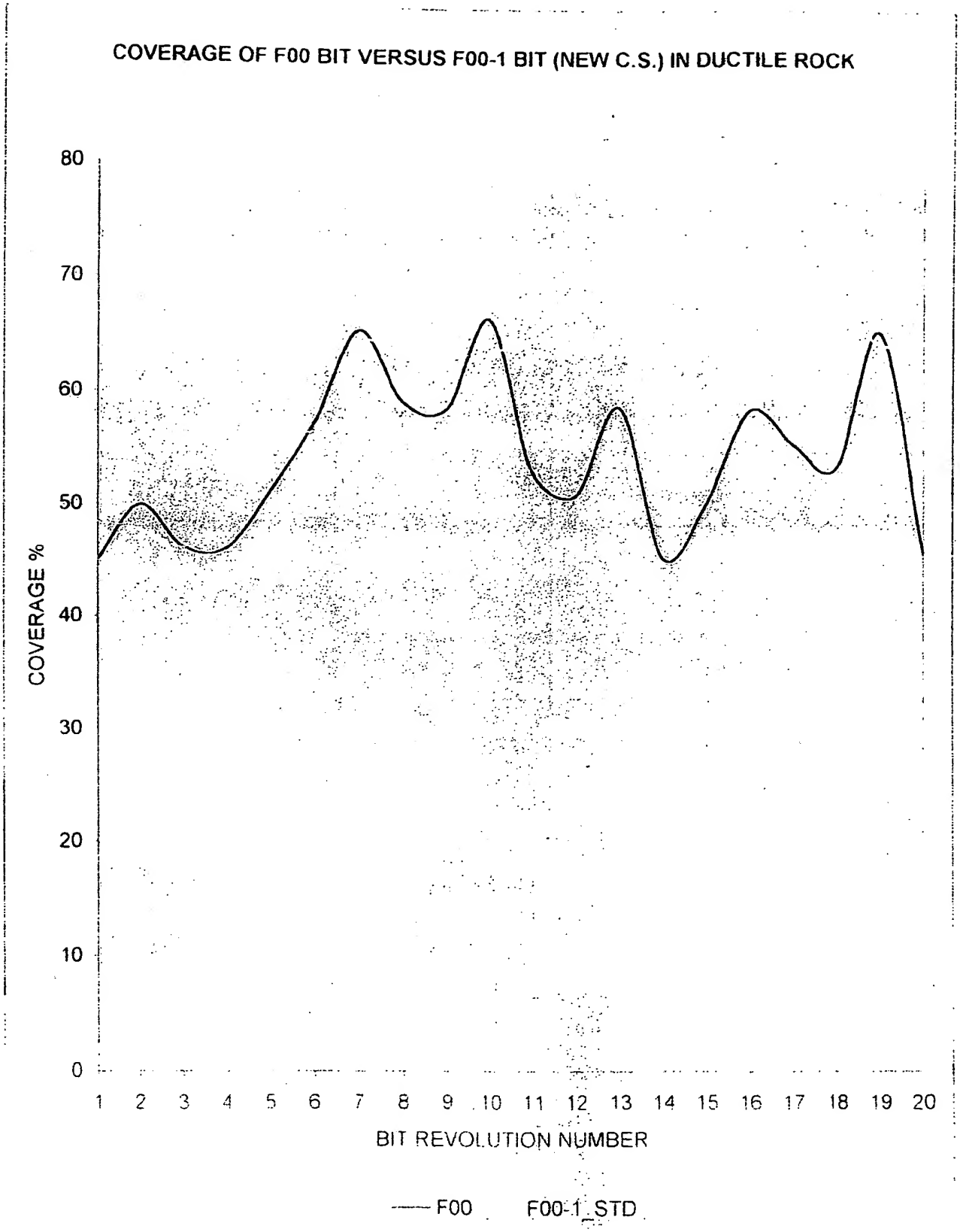

EFFECT OF CHANGING INSERT COUNTS IN DUCTILE ROCK FOR F00 BIT
CONE ROTATION RATIO
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1.367
1.341
1.337
1.355
1.227
1.225
1.231
1.225
1.202
1.164
1.178
1.157
F00_B (-1)
F00 (STD)
F00_A (+1)
F00_C (+2)
CONE1
CONE2
CONE3


EFFECT OF CHANGING INSERT COUNTS IN BRITTLE ROCK FOR F00 BIT
50
45
40
35
30
25
20
15
10
5
0
38.32
39.59
42.46
45.15
28.76
26.95
30.93
29.46
F00_B (-1)
F00 (STD)
F00_A (+1)
F00_C (+2)
R.O.P
COVERAGE

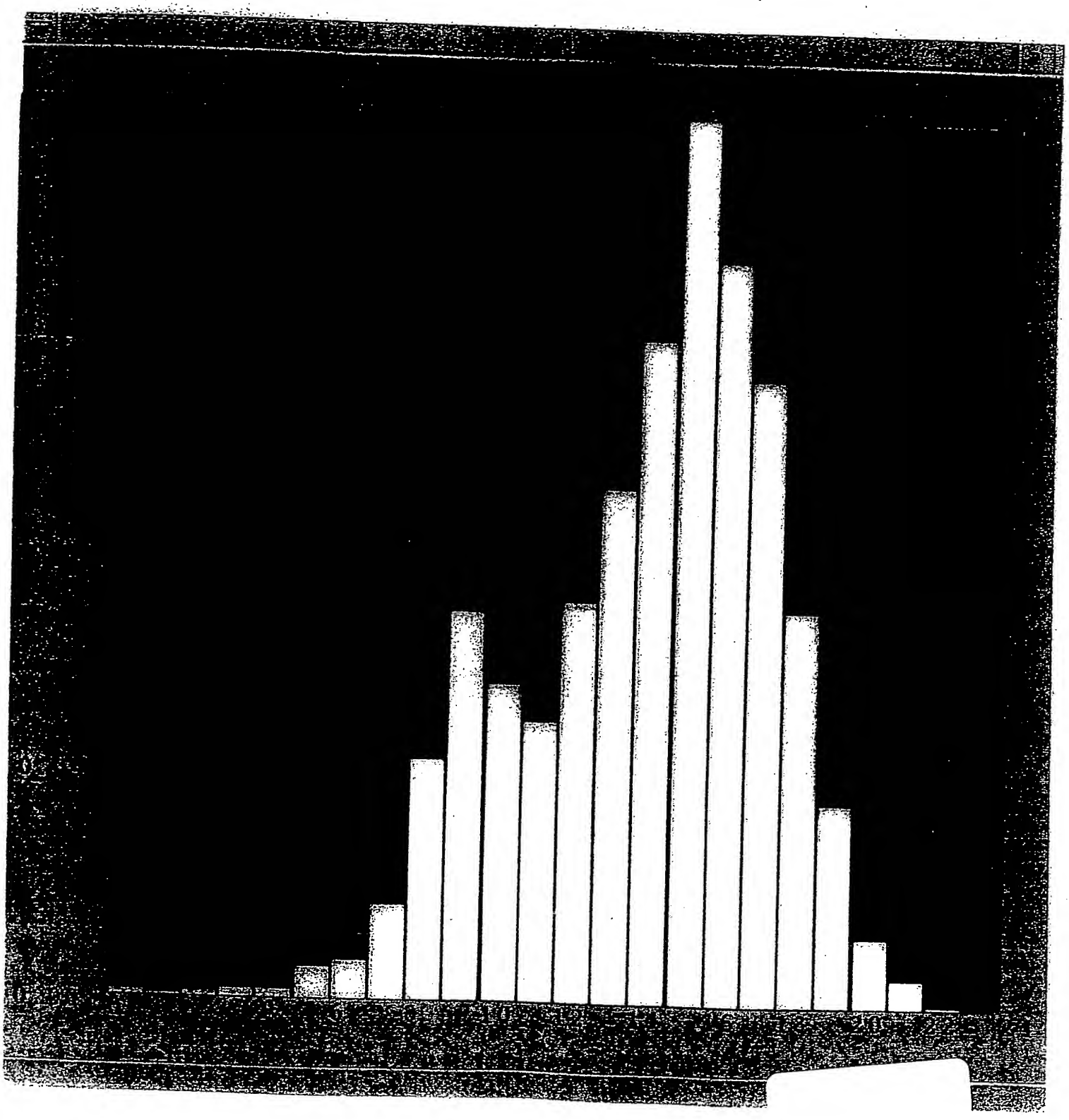

EFFECT OF CHANGING INSERT COUNTS ON COVERAGE IN BRITTLE ROCK
60
50
40
30
20
10
0
COVERAGE %
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
BIT REVOLUTION NUMBER
F00
F00_A
F00_B
F00_C


EFFECT OF CHANGING INSERT COUNTS IN BRITTLE ROCK FOR F00 BIT
16
14
12
10
8
6
4
2
0
11.3
12
13
14
5.82
6.06
7.19
7.18
0.78
0.47
0.58
0.43
F00_B (1)
F00 (STD)
F00_A (+1)
F00_C (+2)
BOHTEETH
BOHFRAC1
BOHFRAC2

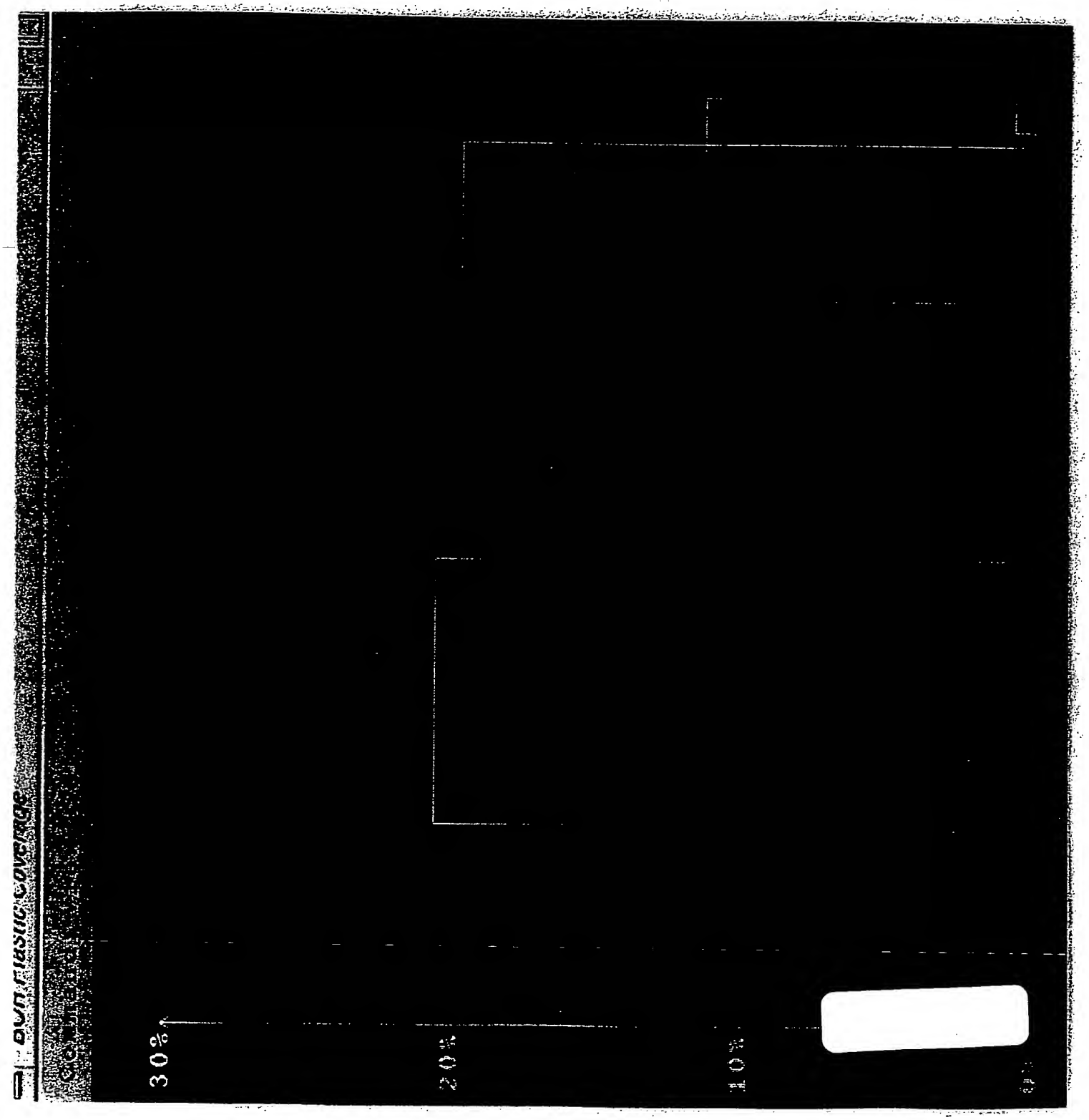

EFFECT OF CHANGING INSERT COUNTS IN BRITTLE ROCK FOR F00 BIT
CONE ROTATION RATIO
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
1.377
1.359
1.345
1.355
1.23
1.218
1.226
1.225
1.172
1.156
1.162
1.157
F00_B (-1)
F00 (STD)
F00_A (+1)
F00_C (+2)
CONE1
CONE2
CONE3


COVERAGE OF F00 BIT VERSUS F00-1 BIT (NEW C.S.) IN DUCTILE ROCK
80
70
60
50
40
30
20
10
0
COVERAGE %
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
BIT REVOLUTION NUMBER
F00
F00-1_STD

BIT TYPE:
ROCK: DUCTILE

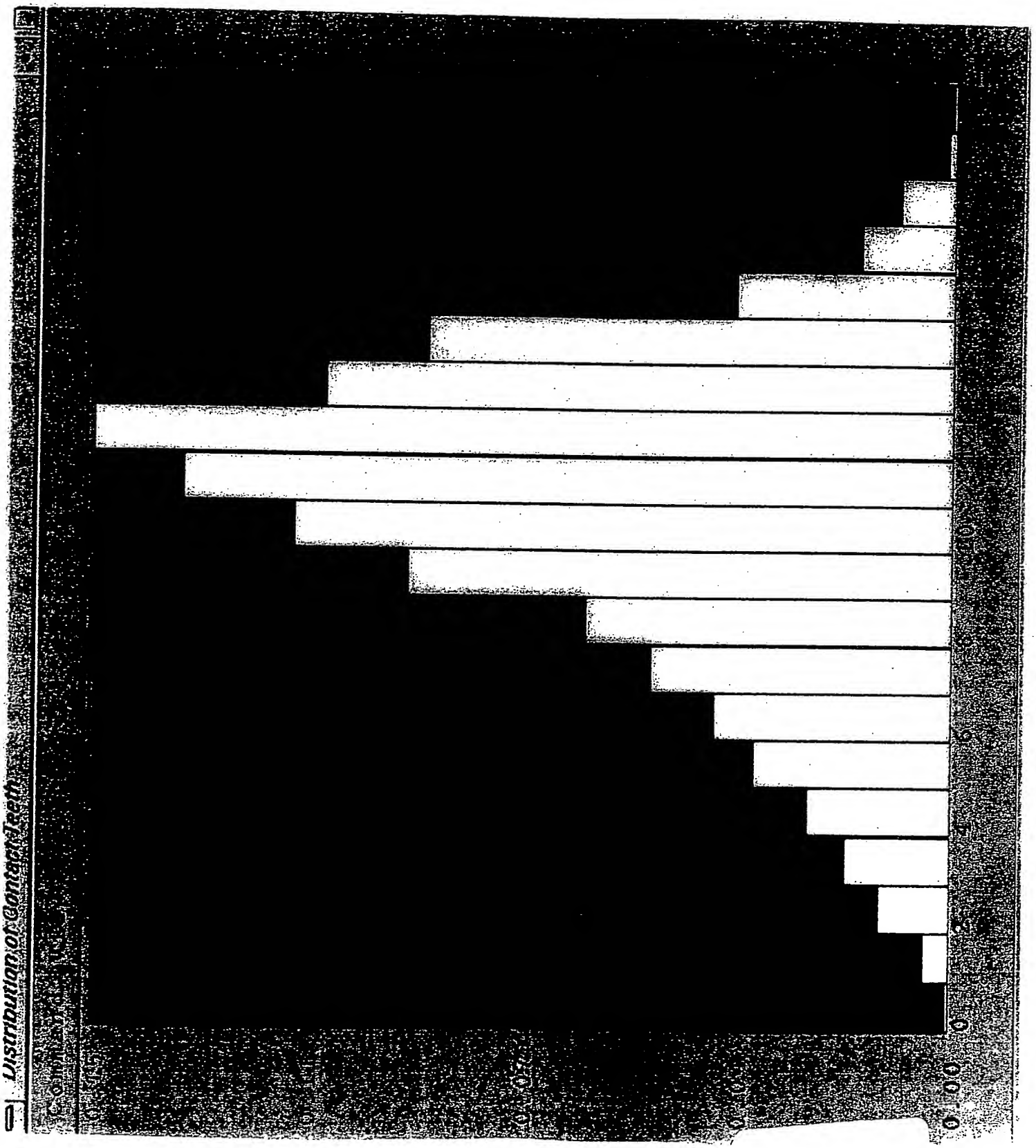


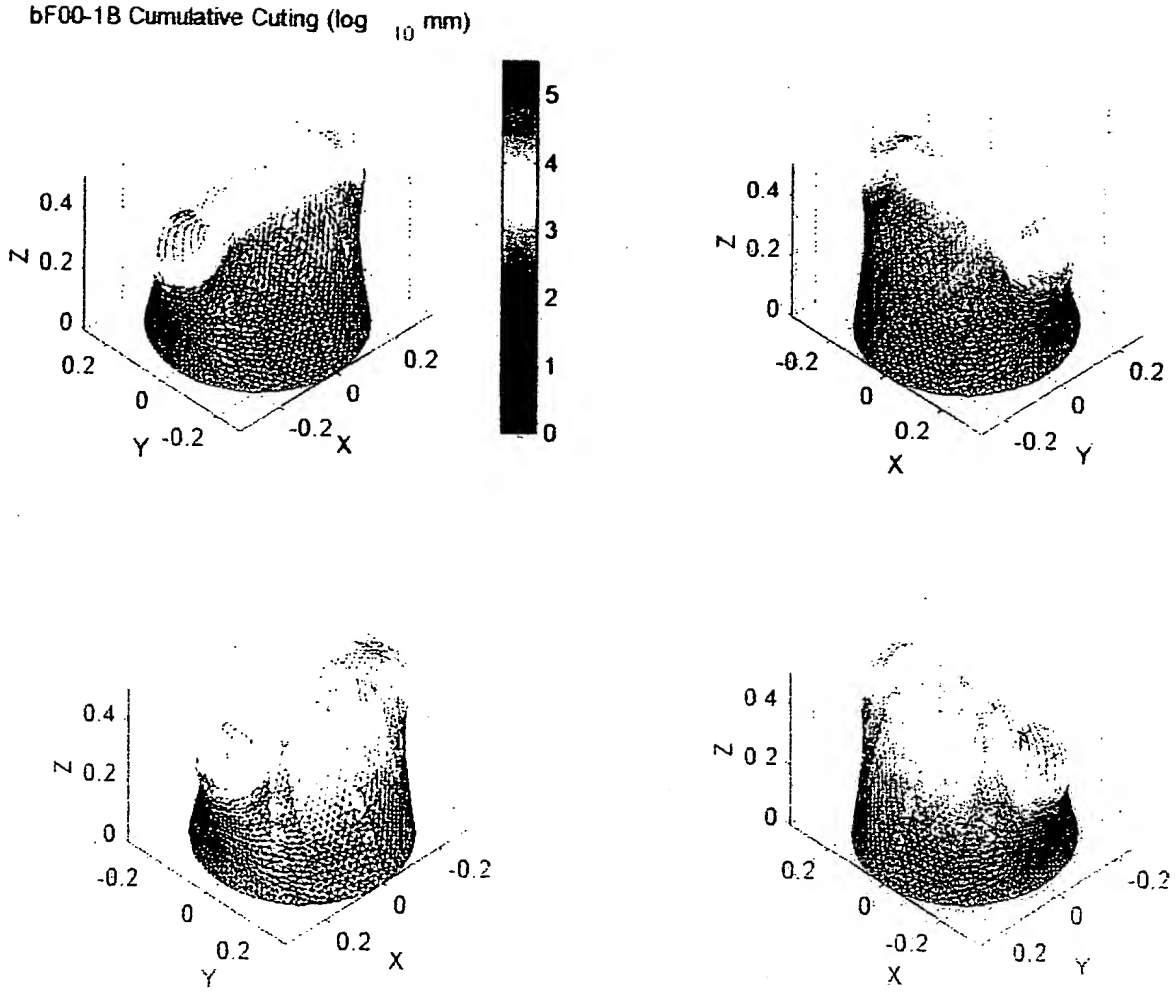
BIT TYPE: *F00-1 STD*
ROCK: ***BRITTLE***

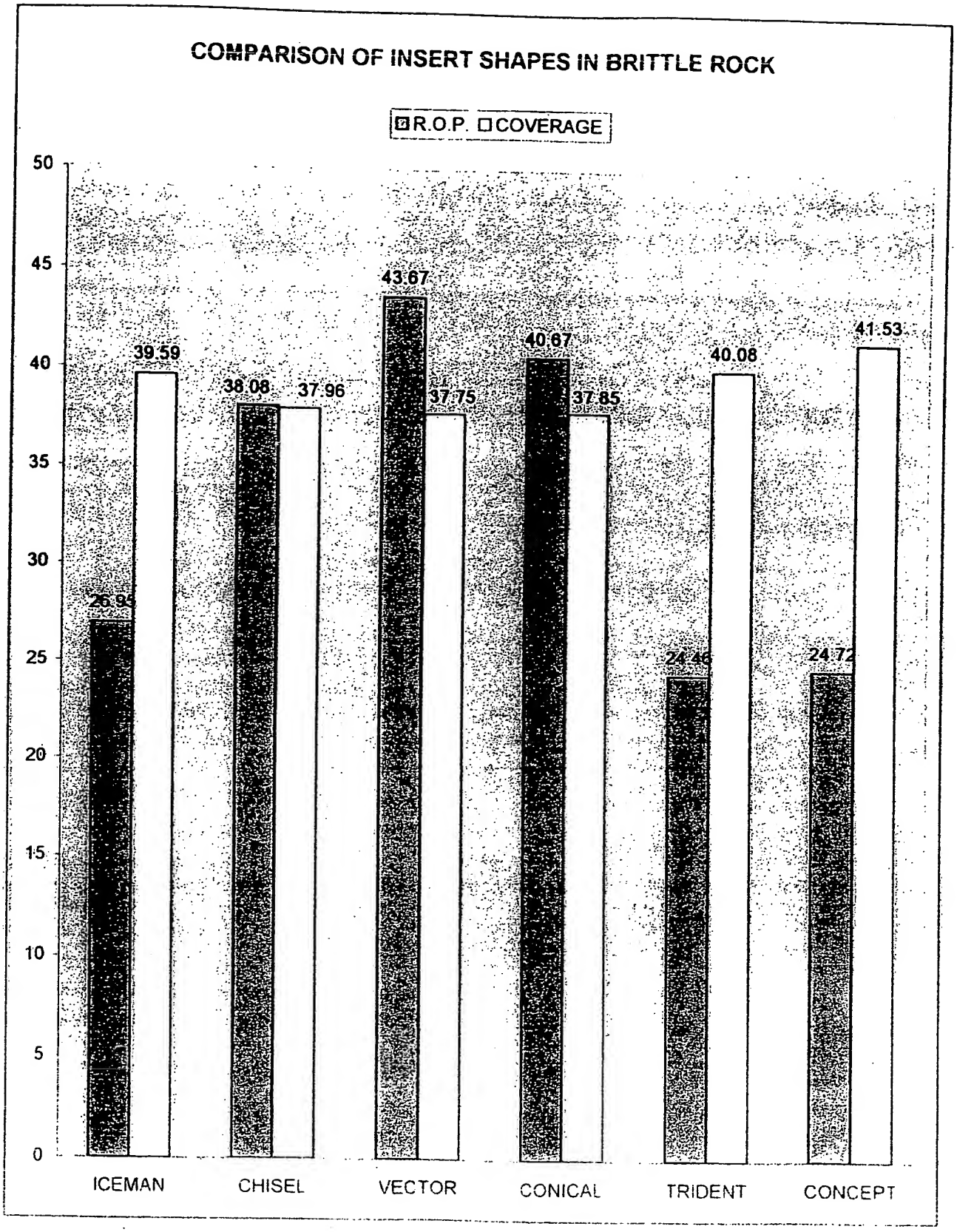


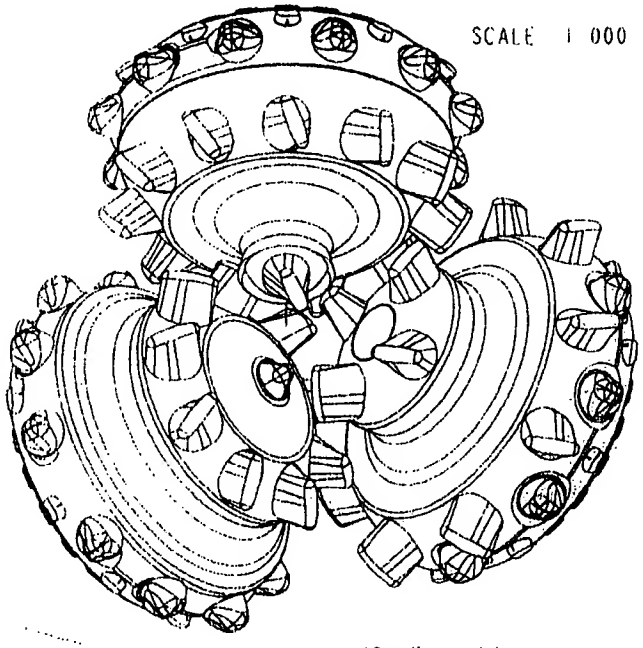
BIT TYPE:

ROCK: BRITTLE

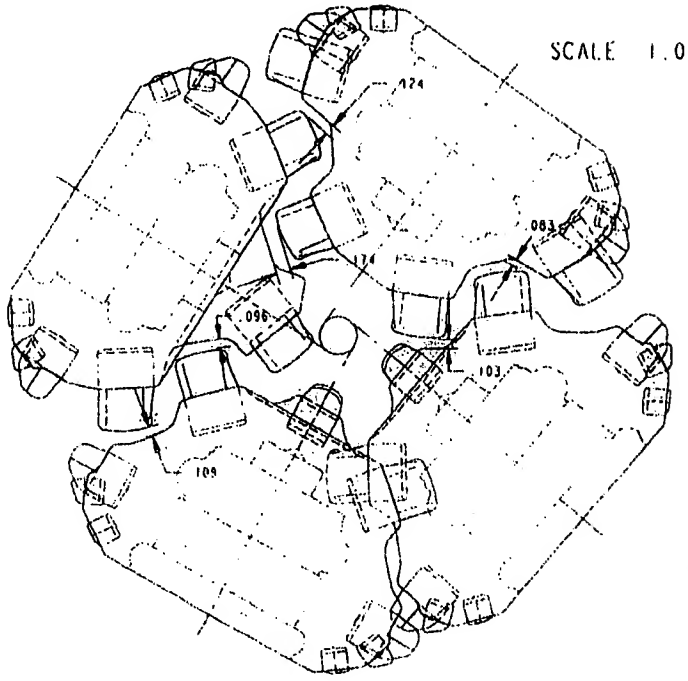



bF00-1B Cumulative Cuting (log 10 mm)
5
4
3
2
1
0
Z
0.4
0.2
0
0.2
0
-0.2
Y
0.2
0
-0.2
X
Z
0.4
0.2
0
-0.2
0
0.2
X
0.2
0
-0.2
Y
Z
0.4
0.2
0
-0.2
0
0.2
Y
-0.2
0
0.2
X
Z
0 4
0 2
0
0.2
0
-0.2
X
-0.2
0
0.2
Y


COMPARISON OF INSERT SHAPES IN BRITTLE ROCK
R.O.P.
COVERAGE
50
45
40
35
30
25
20
15
10
5
0
39.59
38.08
37.96
43.67
37.75
40.67
37.85
40.08
41.53
24.72
ICEMAN
CHISEL
VECTOR
CONICAL
TRIDENT
CONCEPT

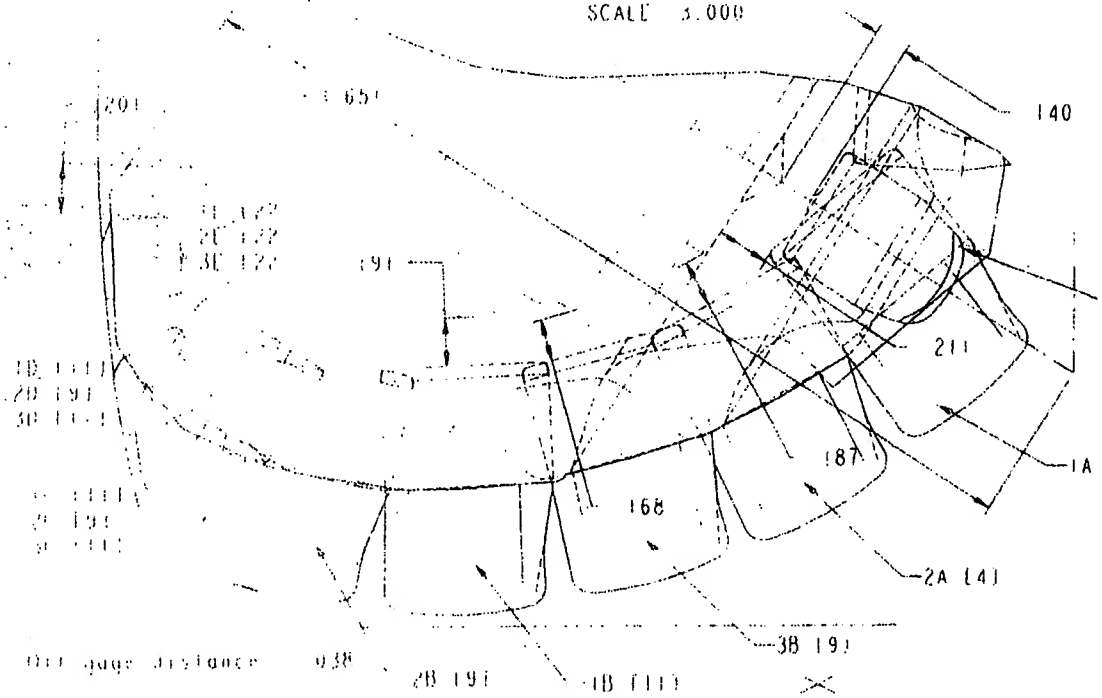


SCALE 1.000



SCALE 1.000

SCALE 3.000



NAME		ORCA-811								
	ROW	INSERT	COUNT	PITCH	TYPE	DIA/WID	LENGTH	EXT	GRIP	GRADE
CONE1										
	A	ORCA3	11		ORCA	.5625	.675	.510	.480	616
	B	ORCA3	11		ORCA	.5625	.675	.510	.480	616
	C	R.GAGE	11		R.GAGE	.5625		.370	.410	510
	D	0018628	11		SLC	.3125		.160	.240	411
	E	0018134	22		SLC	.3125		.040	.266	406
CONE2										
	A	ORCA1	9		ORCA	.5625	.675	.510	.450	616
	B	ORCA1	9		ORCA	.5625	.675	.510	.450	616
	C	R.GAGE	9		R.GAGE	.5625		.370	.410	510
	D	0018628	9		SLC	.3125		.160	.240	411
	E	0018134	22		SLC	.3125		.040	.266	406
CONE3										
	A	0020323	1		RBC	.500		.300	.380	616
	B	ORCA1	9		ORCA	.5625	.675	.510	.450	616
	C	R.GAGE	11	11.45	R.GAGE	.5625		.370	.410	510
	D	0018628	11	11.45	SLC	.3125		.160	.240	411
	E	0018134	22	11.45	SLC	.3125		.040	.266	406

UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE AS FOLLOWS:

PART NUMBER L1077-ORCA

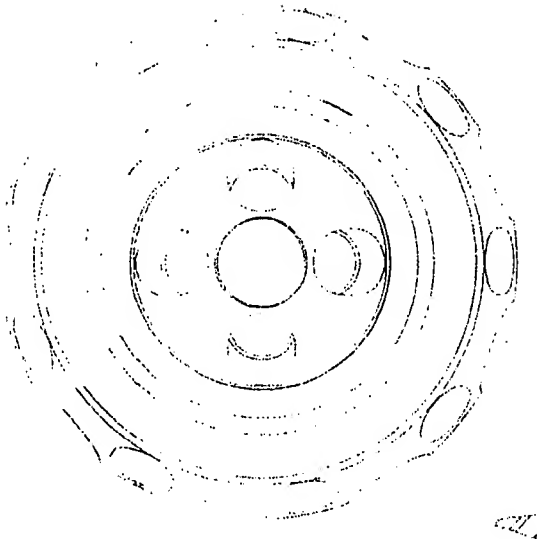
SMITH TOOL
Division of Smith International Inc

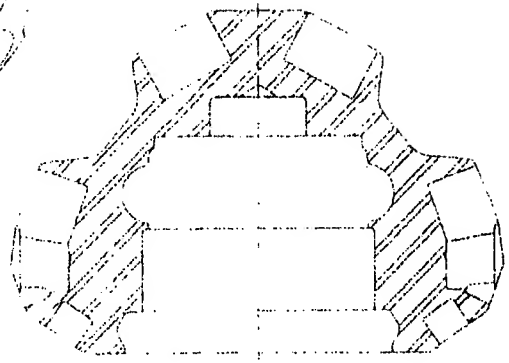
077 100 BIT LAYOUT
ORCA INSERTS

SCALE: 0.3	MODEL NAME: L1077-ORCA		SHEET 1 OF 1
SIZE: C	DRAWN: AS	DATE: 4-Jun-98	DRAWING NO.: DL1077-ORCA

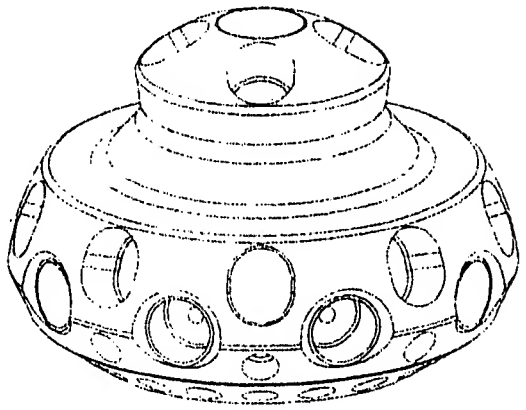
REV

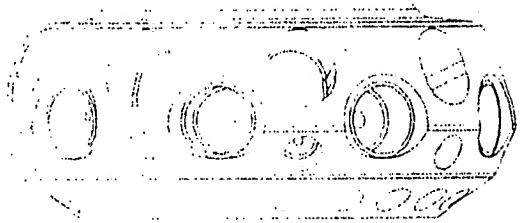
ROW	COUNT	2D .GE	3D .CE	3D .EL .S
A	4	.139		
B	9	.532	.060	.072
C	9	.589	.232	.081
D	9	.966	.220	
E	22	.178		





SECTION A-A





UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE AS FOLLOWS
DECIMAL .X ±0.1
DECIMAL .XX ±0.01
DECIMAL .XXX ±0.005
DECIMAL .XXXX ±0.0005
ANGULAR ±0.25
FRACTIONAL ±1/64
FILLETS R .03
REMOVE ALL BURRS AND BREAK SHARP CORNERS .005 MAX

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REV	E C & DESC	DATE	BY

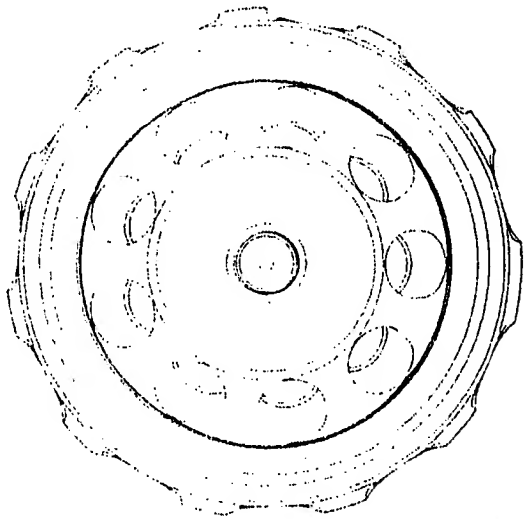
PART NUMBER CONE2

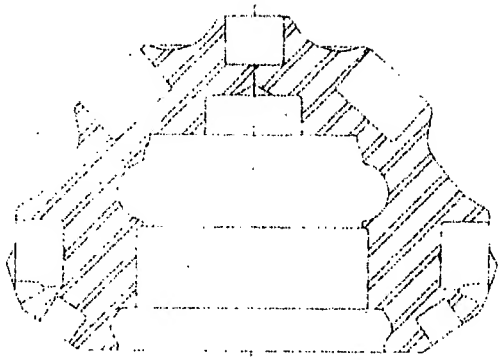
SMITH TOOL

CONE 2
PROFILE AND DRILLING

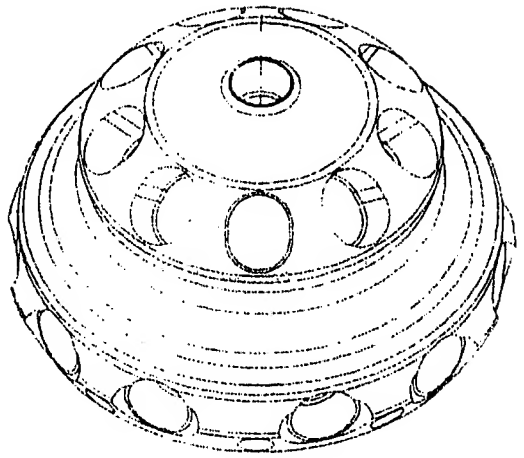
SCALE 0	MODEL NAME CONE2	SHEET 1 OF
SIZE B / DRAWN	DATE 8-Jun-98	DRAWING NO CONE2 / REV

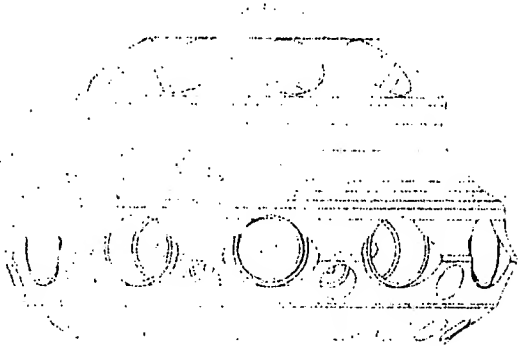
ROW	COUNT	2D_CL	3D_CL	3D_CL_S
A				
B	4	076		
C	11_45	358	.17	081
D	11_45	716	.25	
E	22	128		





SECTION A-A





REV	L O & DESC	DATE	BY

UNLESS OTHERWISE SPECIFIED
TOLERANCES ARE AS FOLLOWS
DECIMAL .X ±0.1
DECIMAL .XX ±0.01
DECIMAL .XXX ±0.005
DECIMAL .XXXX ±0.0001
ANGULAR ±0.5°
FRACTIONAL ±1/64
FILLETS .031
REMOVE ALL BURRS AND BREAK SHARP CORNERS .005 .010

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PART NUMBER CONE 3

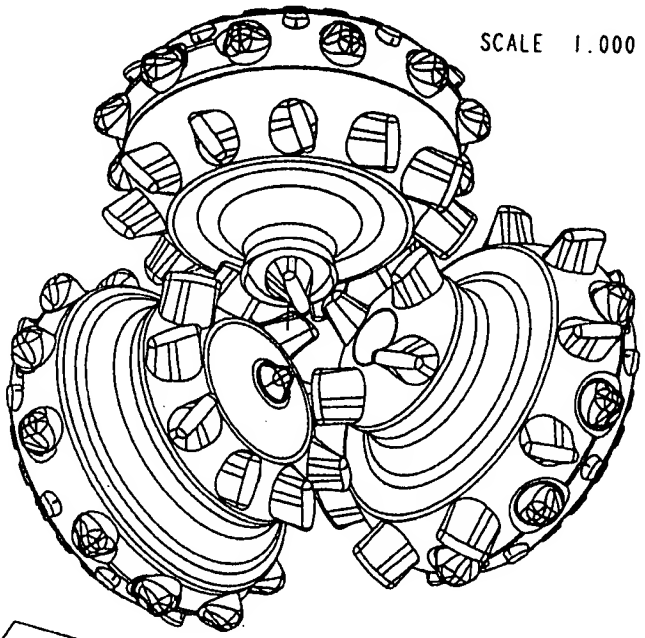
SMITH TOOL

CONE #3
PROFILE AND DRILLING

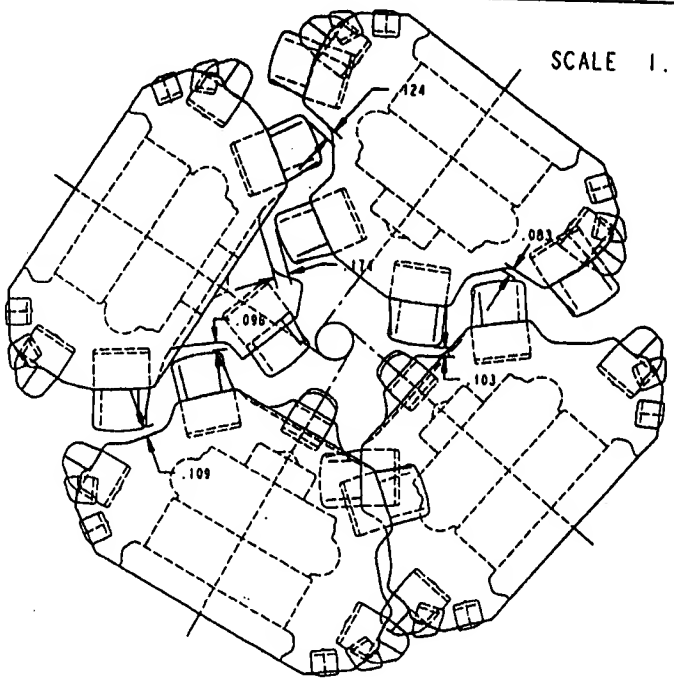
SIZE	DRAWN	MODEL NAME CONE 3	SHEET OF
B		DATE 8 Jun-98	DRAWING NO CONE 3 REV

Insert Retention Tests

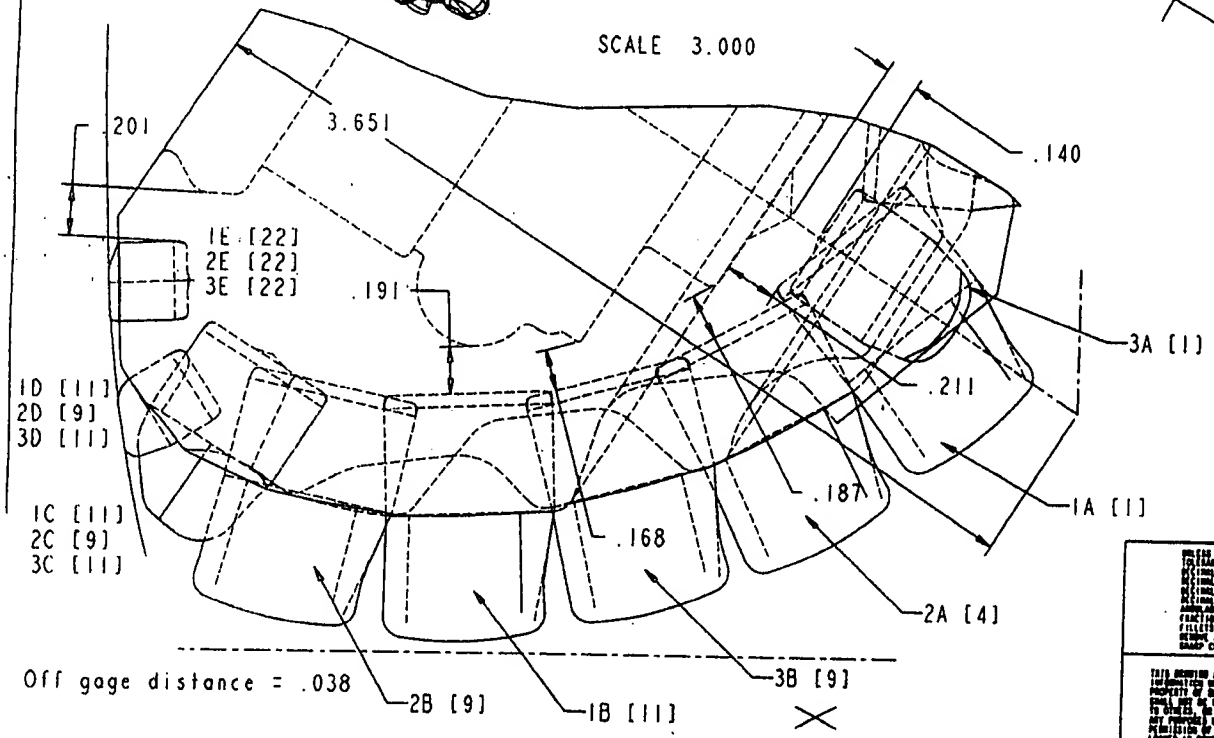
- Oblong inserts
  - .675 length, .5625 width, .450 grip
  - .675 length, .5625 width, .480 grip
  - .625 length, .5625 width, .450 grip
- Standard inserts
  - .5625 diameter, .480 grip
  - .5625 diameter, .450 grip



SCALE 1.000



SCALE 1.000



NAME		ORCA-BIT								
	ROW	INSERT	COUNT	PITCH	TYPE	DIA/WID	LENGTH	EXT	GRIP	GRADE
CONE1										
	A	ORCA3	1	-	ORCA	.5625	.675	.510	.480	616
	B	ORCA3	11	-	ORCA	.5625	.675	.510	.480	616
	C	R.GAGE	11	-	R.GAGE	.5625		.370	.410	510
	D	0018826	9	-	STC	.3125		.160	.240	411
	E	0018134	22	-	STC	.3125		.040	.288	408
CONE2										
	A	ORCA1	4	-	ORCA	.5625	.675	.510	.450	616
	B	ORCA1	9	-	ORCA	.5625	.675	.510	.450	616
	C	R.GAGE	9	-	R.GAGE	.5625		.370	.410	510
	D	0018826	9	-	STC	.3125		.160	.240	411
	E	0018134	22	-	STC	.3125		.040	.288	408
CONE3										
	A	0020323	1	-	RRC	.500		.300	.360	616
	B	ORCA1	8	-	ORCA	.5625	.675	.510	.450	616
	C	R.GAGE	11	11.45	R.GAGE	.5625		.370	.410	510
	D	0018826	11	11.45	STC	.3125		.160	.240	411
	E	0018134	22	11.45	STC	.3125		.040	.288	408

PART NUMBER: LT077-ORCA -

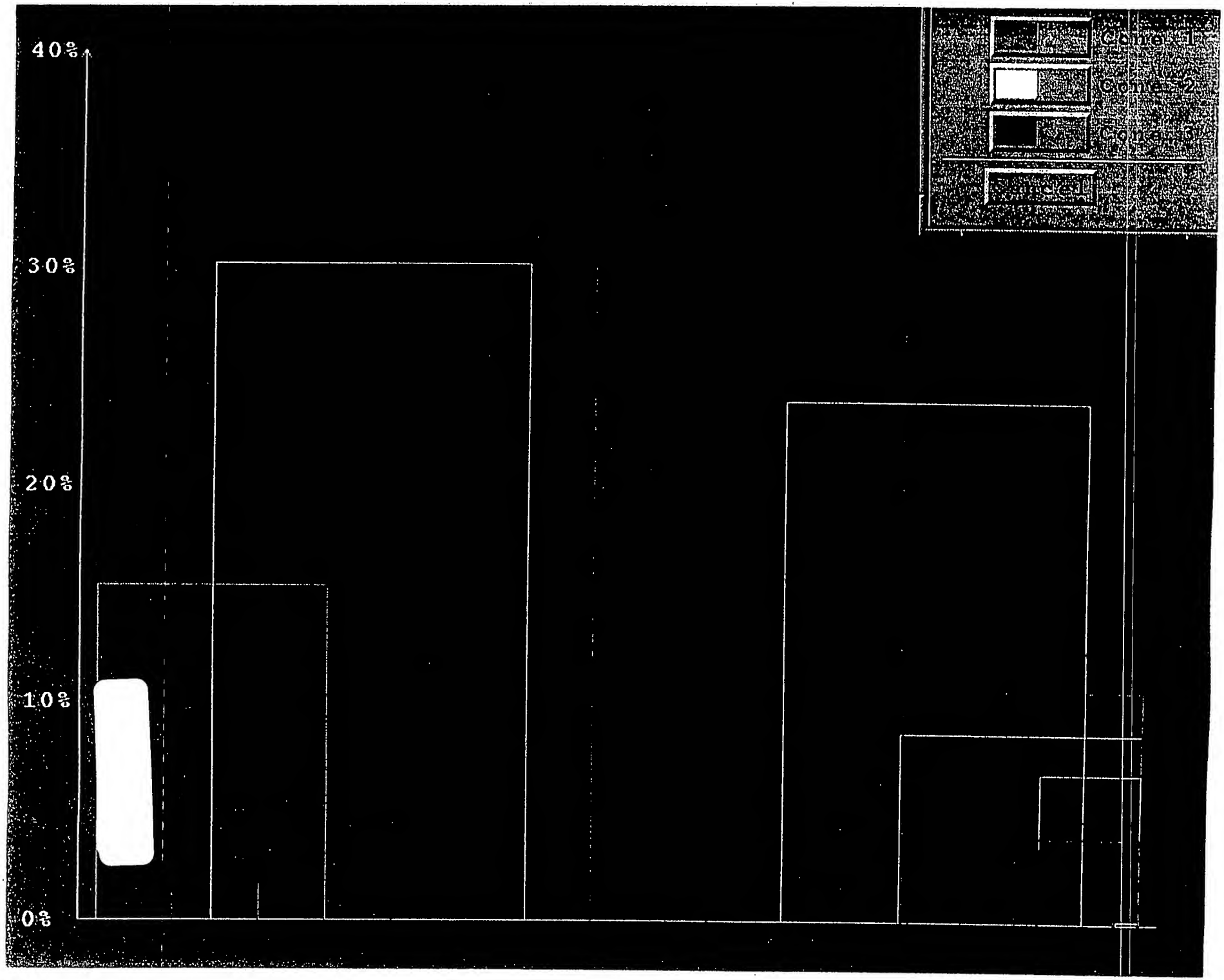
SMITH TOOL
Division of Smith International Inc.

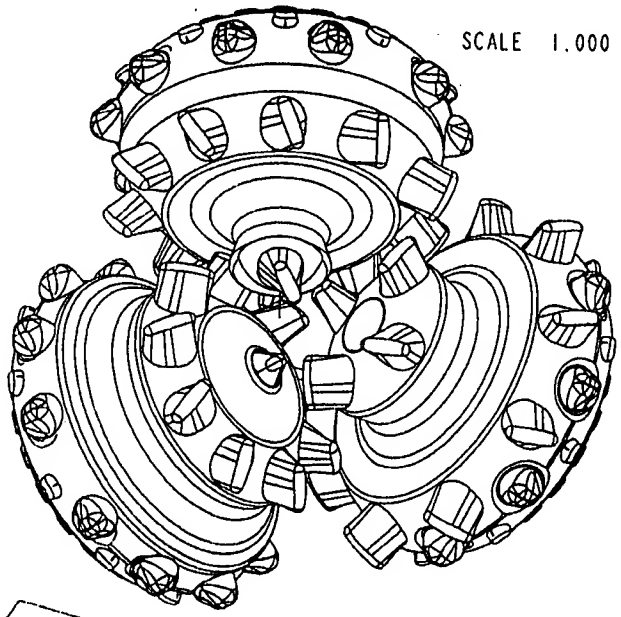
077 F00 BIT LAYOUT
ORCA INSERTS

SCALE: 0.3	MODEL NAME: LT077-ORCA		SHEET: 1 OF 1
SIZE: C	DRAWN: AS	DATE: 4-Jun-98	DRAWING NO.: DLT077-ORCA
			REV: -

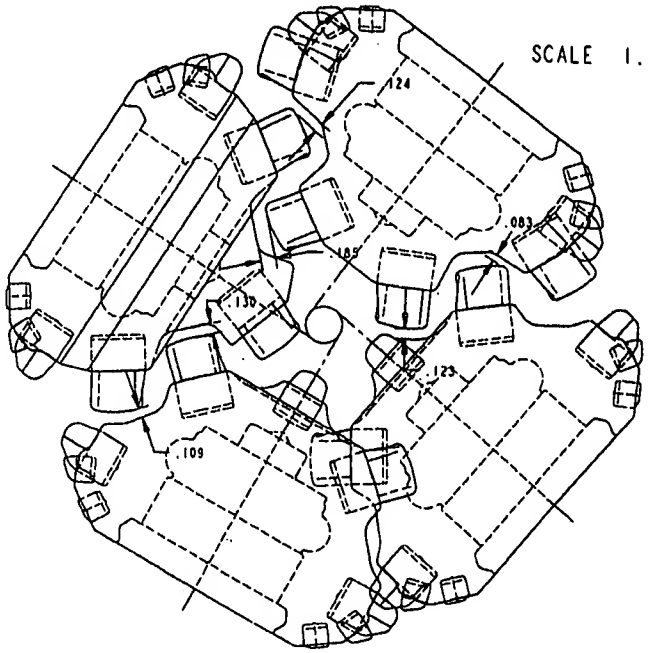
IDEAS Results

- DUCTILE ROCK
  - R.O.P.=25.47 m/hr (2.6 % higher)
  - COVERAGE=55.14 % (1.6 % lower)
- BRITTLE ROCK
  - R.O.P.=24.45 m/hr (9.3 % lower)
  - COVERAGE=36.70 % (7.3 % lower)


40%
30%
20%
10%
0%
Come 1
Come 2
Come 3

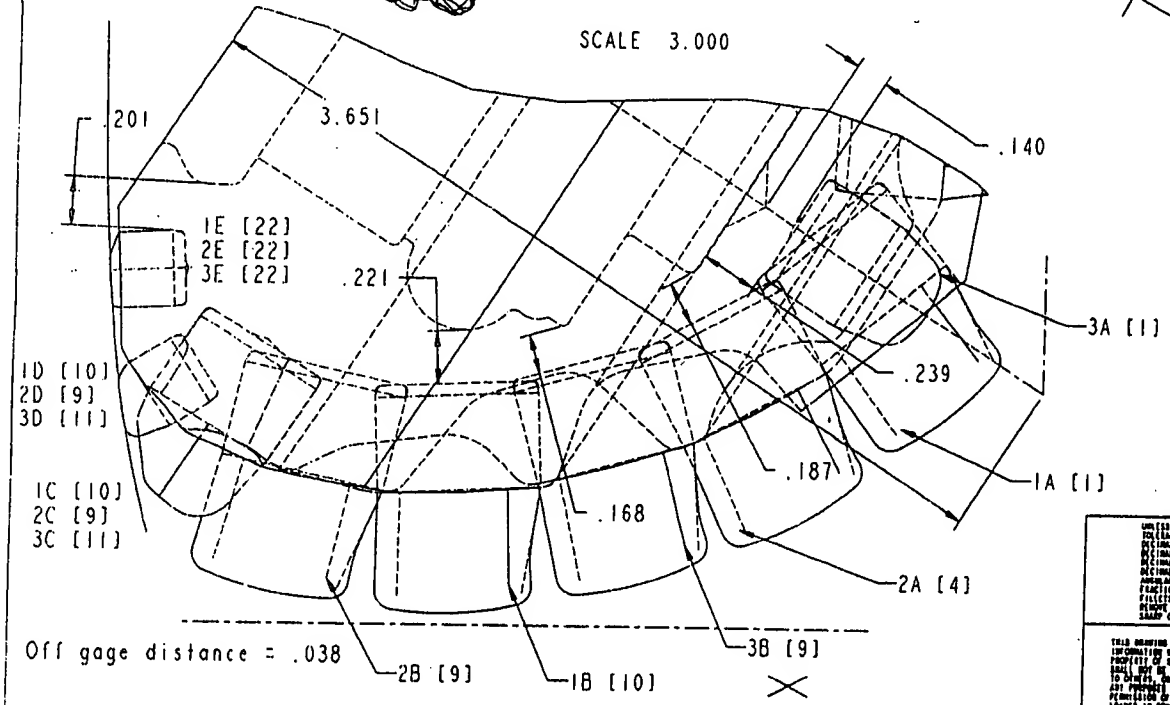


SCALE 1.000



SCALE 1.000

SCALE 3.000



NAME		ORCA-BIT								
	ROW	INSERT	COUNT	PITCH	TYPE	DIA/WID	LENGTH	EXT	GRIP	GRADE
CONE1										
	A	ORCA1	1	-	ORCA	.5625	.675	.510	.450	614
	B	ORCA1	10	10.42	ORCA	.5625	.675	.510	.450	614
	C	R.GAGE	10	10.42	R.GAGE	.5625		.370	.410	510
	D	0018826	10	10.42	SLC	.3125		.180	.240	408
	E	0018134	22	-	SLC	.3125		.040	.266	408
CONE2										
	A	ORCA1	4	-	ORCA	.5625	.675	.510	.450	614
	B	ORCA1	9	-	ORCA	.5625	.675	.510	.450	614
	C	R.GAGE	9	-	R.GAGE	.5625		.370	.410	510
	D	0018826	9	-	SLC	.3125		.180	.240	408
	E	0018134	22	-	SLC	.3125		.040	.266	408
CONE3										
	A	0020323	1	-	ABC	.500		.300	.360	614
	B	ORCA1	9	-	ORCA	.5625	.675	.510	.450	614
	C	R.GAGE	11	11.45	R.GAGE	.5625		.370	.410	510
	D	0018826	11	11.45	SLC	.3125		.180	.240	408
	E	0018134	22	11.45	SLC	.3125		.040	.266	408

PART NUMBER: LT077-ORCA -

UNLESS OTHERWISE SPECIFIED TOLERANCES ARE TO FOLLOWS:
DECIMAL: .X ±0.1
DECIMAL: .XX ±0.01
DECIMAL: .XXX ±0.005
DECIMAL: .XXXX ±0.0001
ANGULAR ±0°30'
FRACTIONAL ±1/32
FILLETS .03
BREAK ALL EDGES AND BREAK SHARP CORNERS .005 - .010

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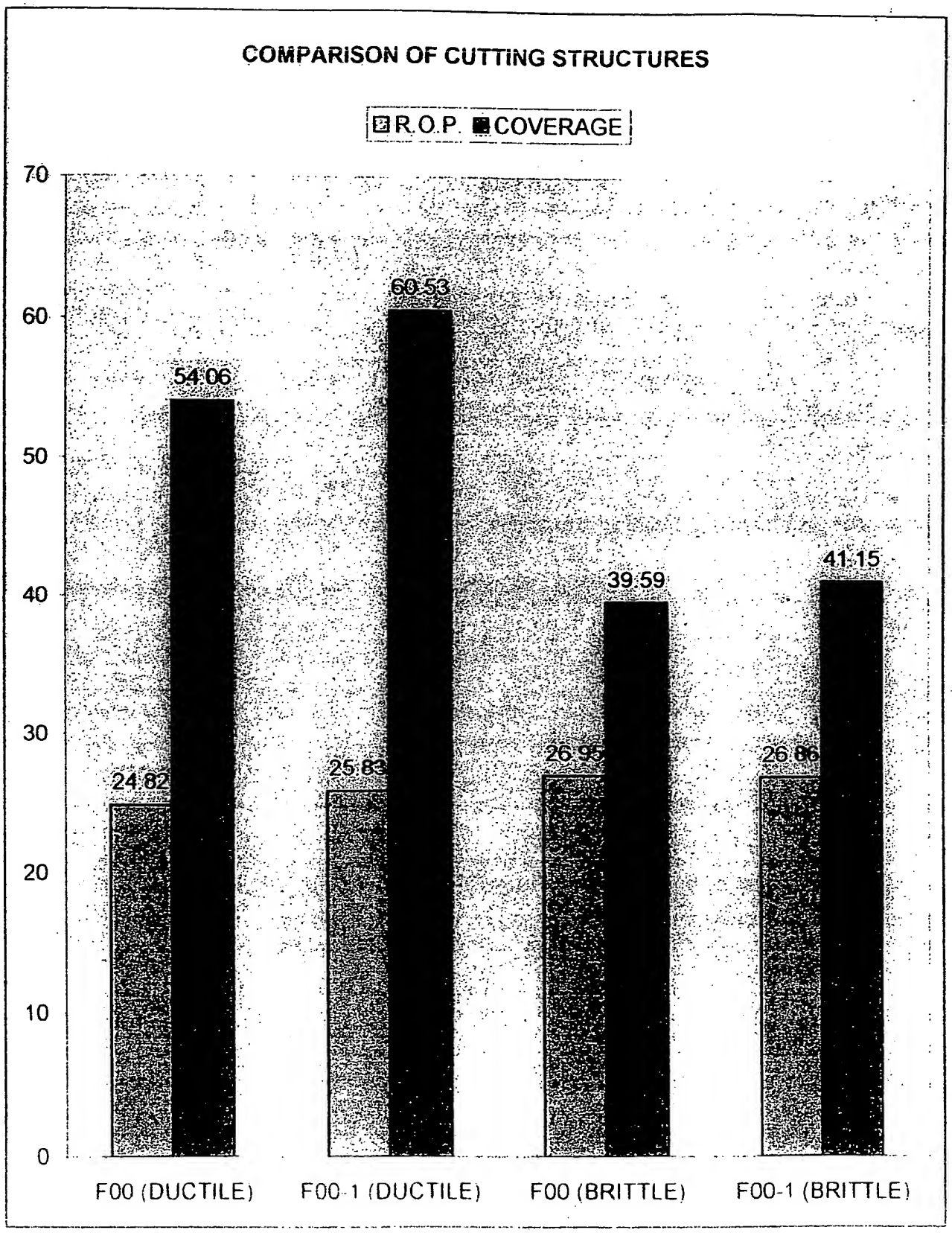
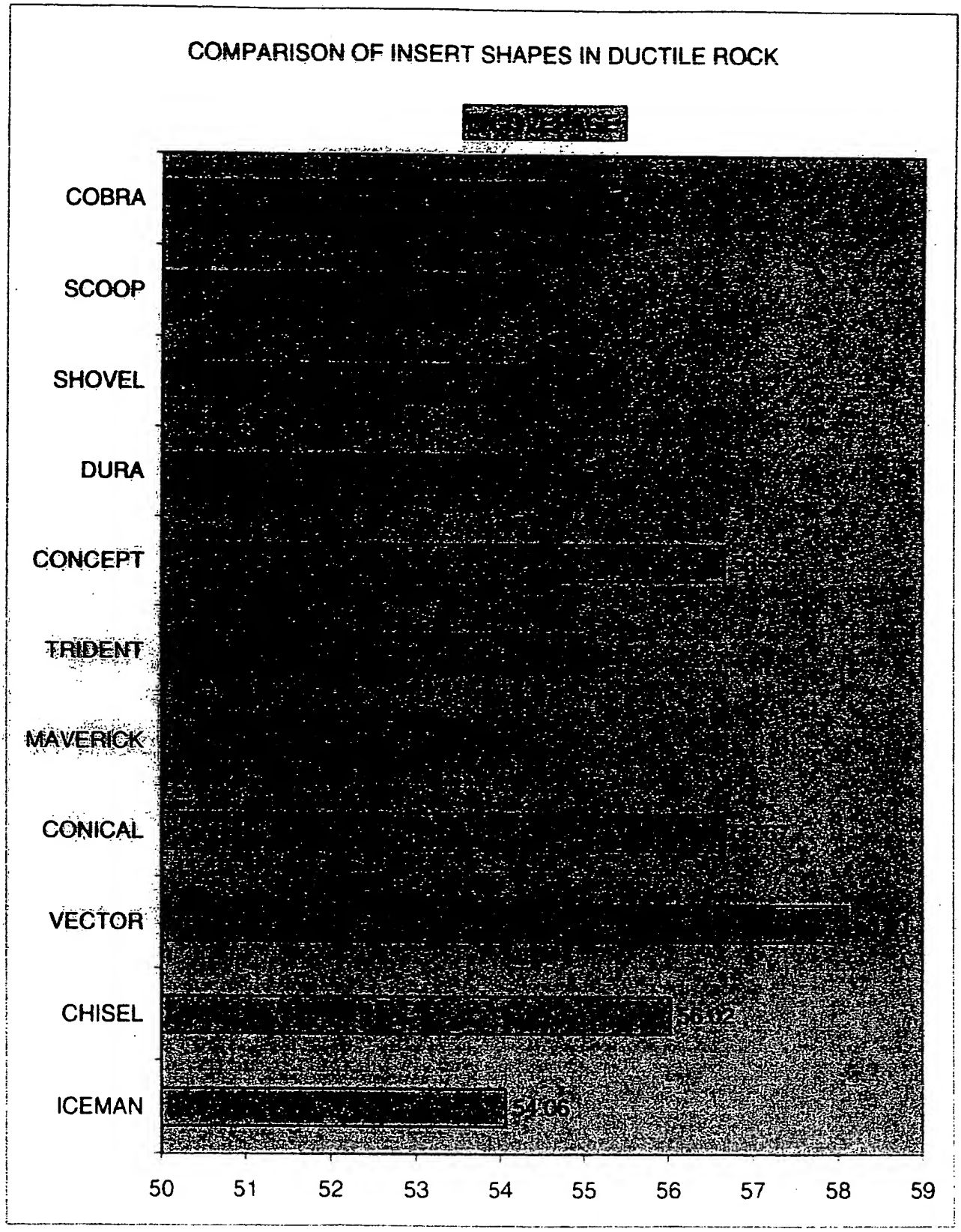
SMITH TOOL
Division of Smith International Inc.

077 F00 BIT LAYOUT
ORCA INSERTS

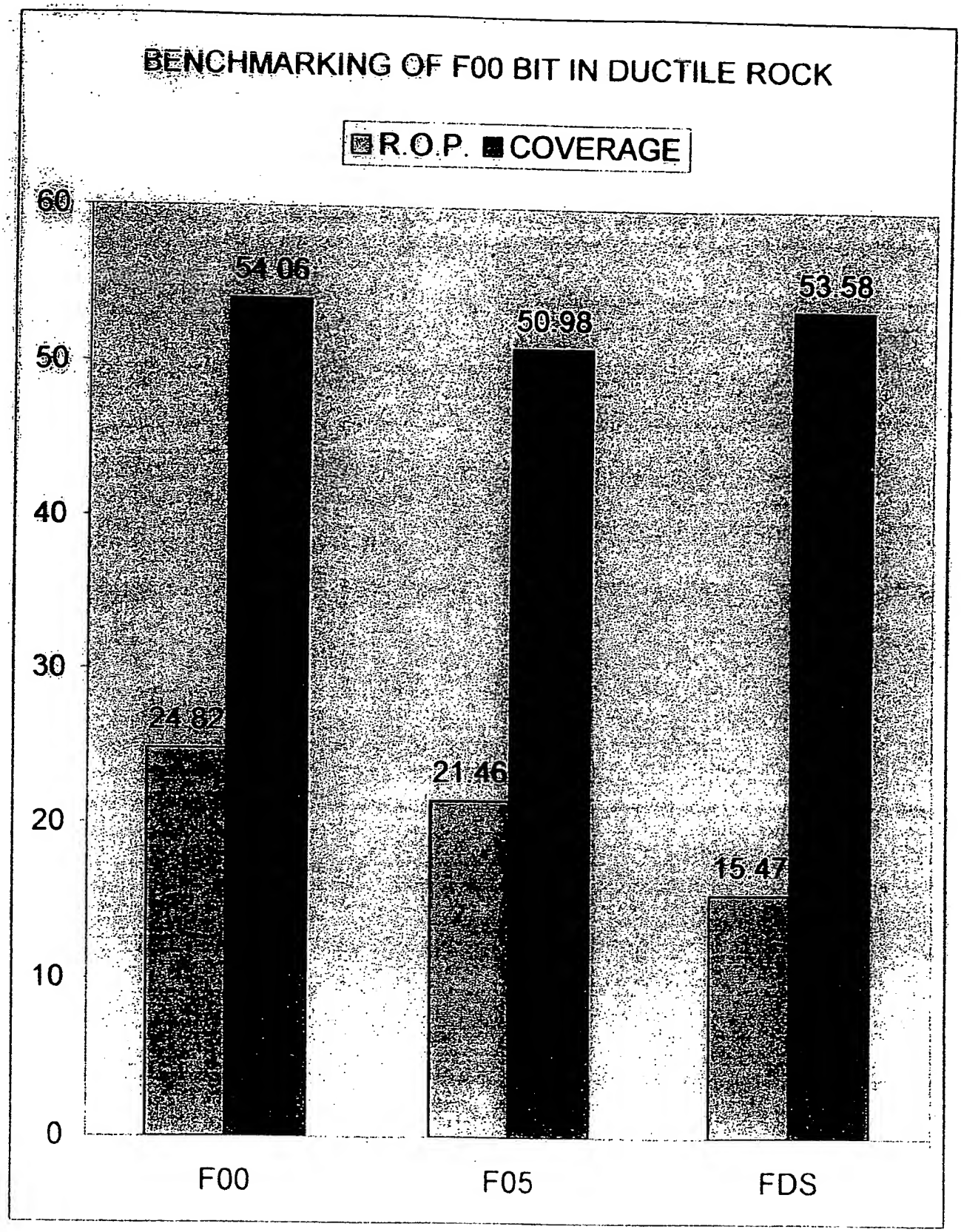
SCALE: 0.3 | MODEL NAME: LT077-ORCA | SHEET: 1 OF 1

SIZE	DRAWN	DATE	DRAWING NO.	REV
C	AS	4-Jun-98	DLT077-ORCA	-


COMPARISON OF CUTTING STRUCTURES
R.O.P.
COVERAGE
70
60
50
40
30
20
10
0
54.06
60.53
39.59
41.15
24.82
25.83
26.95
26.86
F00 (DUCTILE)
F00-1 (DUCTILE)
F00 (BRITTLE)
F00-1 (BRITTLE)


COMPARISON OF INSERT SHAPES IN DUCTILE ROCK
COBRA
SCOOP
SHOVEL
DURA
CONCEPT
TRIDENT
MAVERICK
CONICAL
VECTOR
CHISEL
ICEMAN
5106
50
51
52
53
54
55
56
57
58
59

Rotx
Roty
Dolly


BENCHMARKING OF F00 BIT IN DUCTILE ROCK
R.O.P.
COVERAGE
60
50
40
30
20
10
0
54.06
24.82
50.98
21.46
53.58
15.47
F00
F05
FDS

Achieving The Goal in Brittle Rock

INSERT SHAPES

R.O.P. = 62% Increase [Vector] (Coverage being 5% lower)

COVERAGE = 5% Increase [Concept] (R.O.P. being 9% lower)

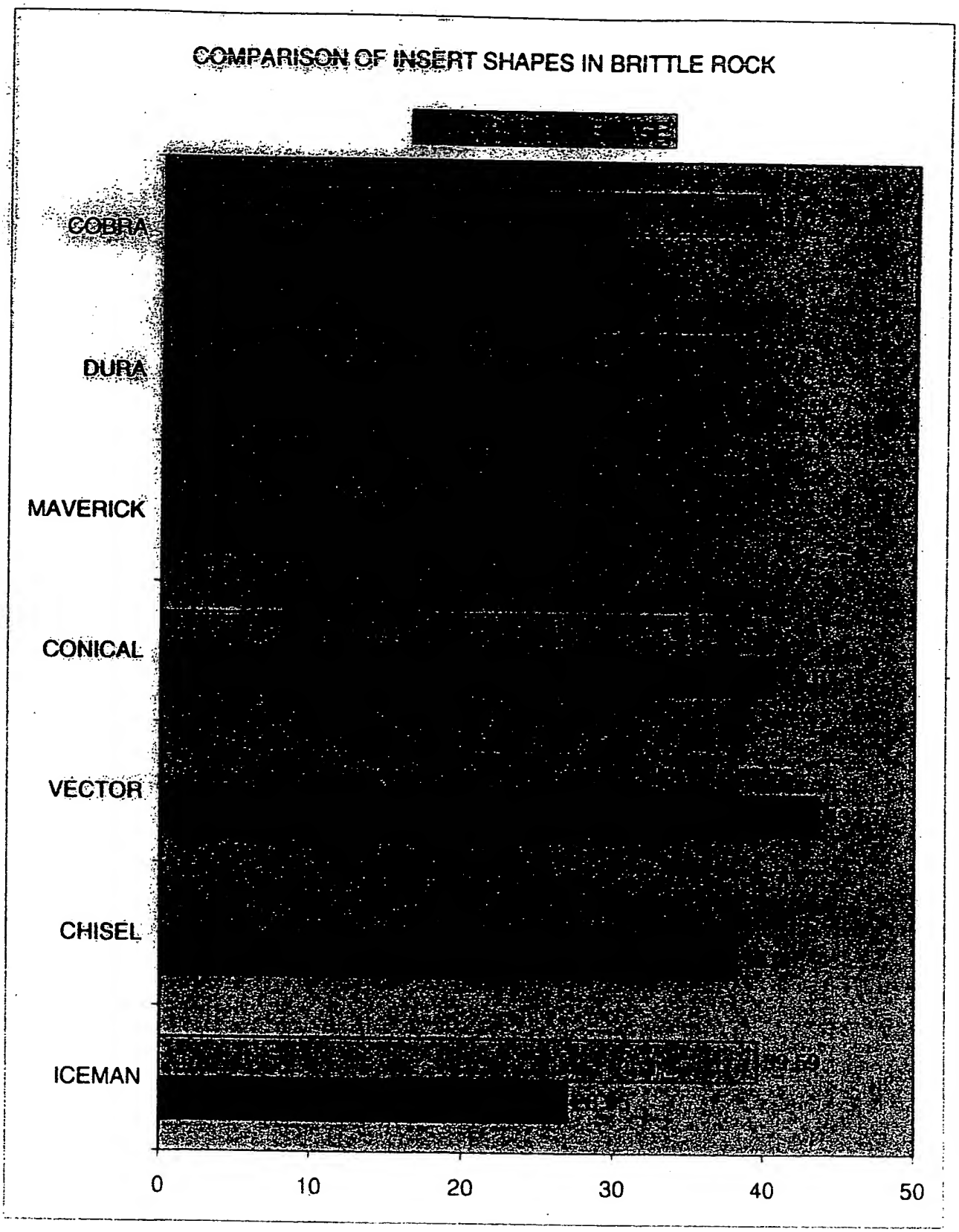
ROW COUNTS

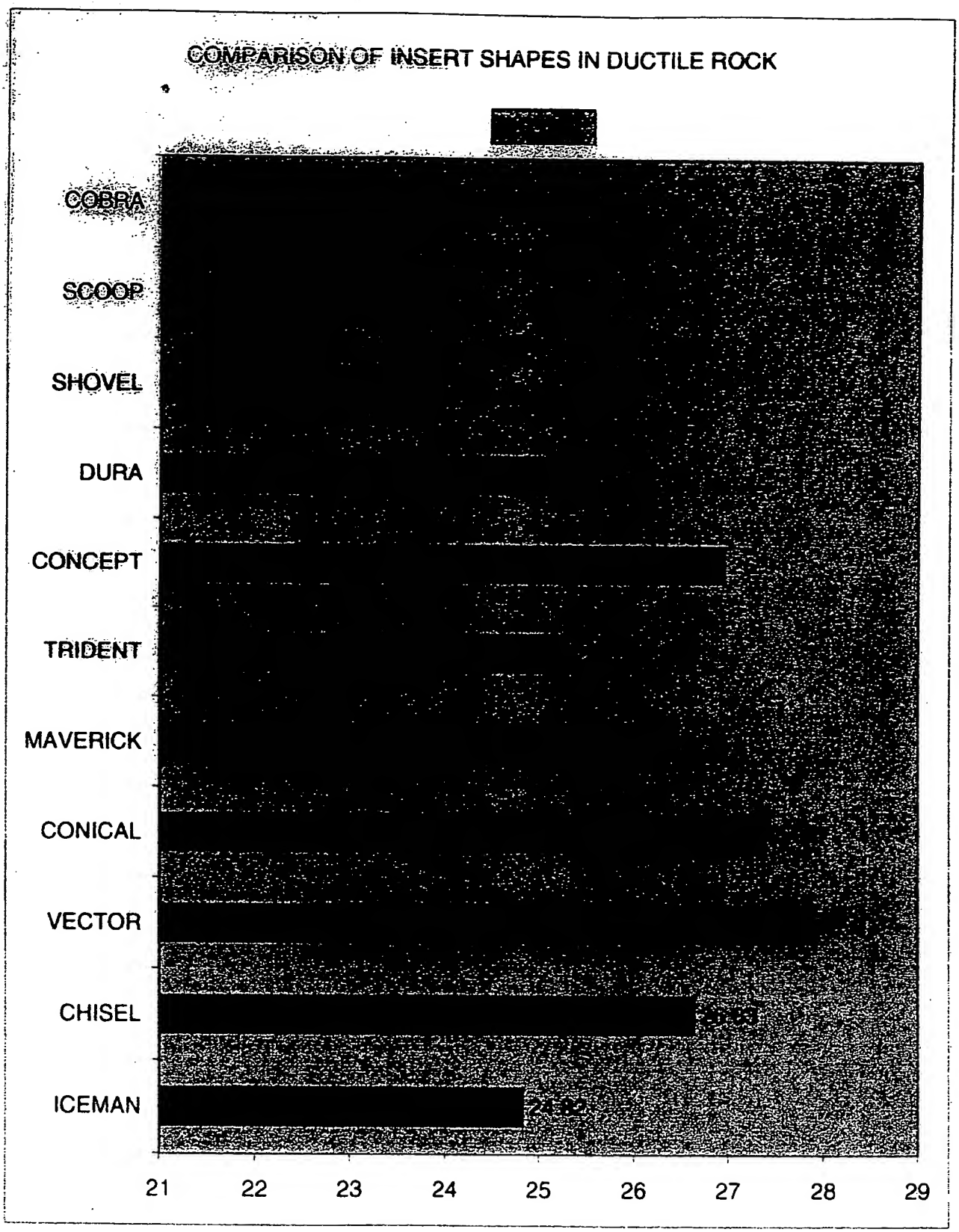
R.O.P. = 15% Increase [+1 Insert on each row]

COVERAGE = 14% Increase [+2 Inserts on each row]

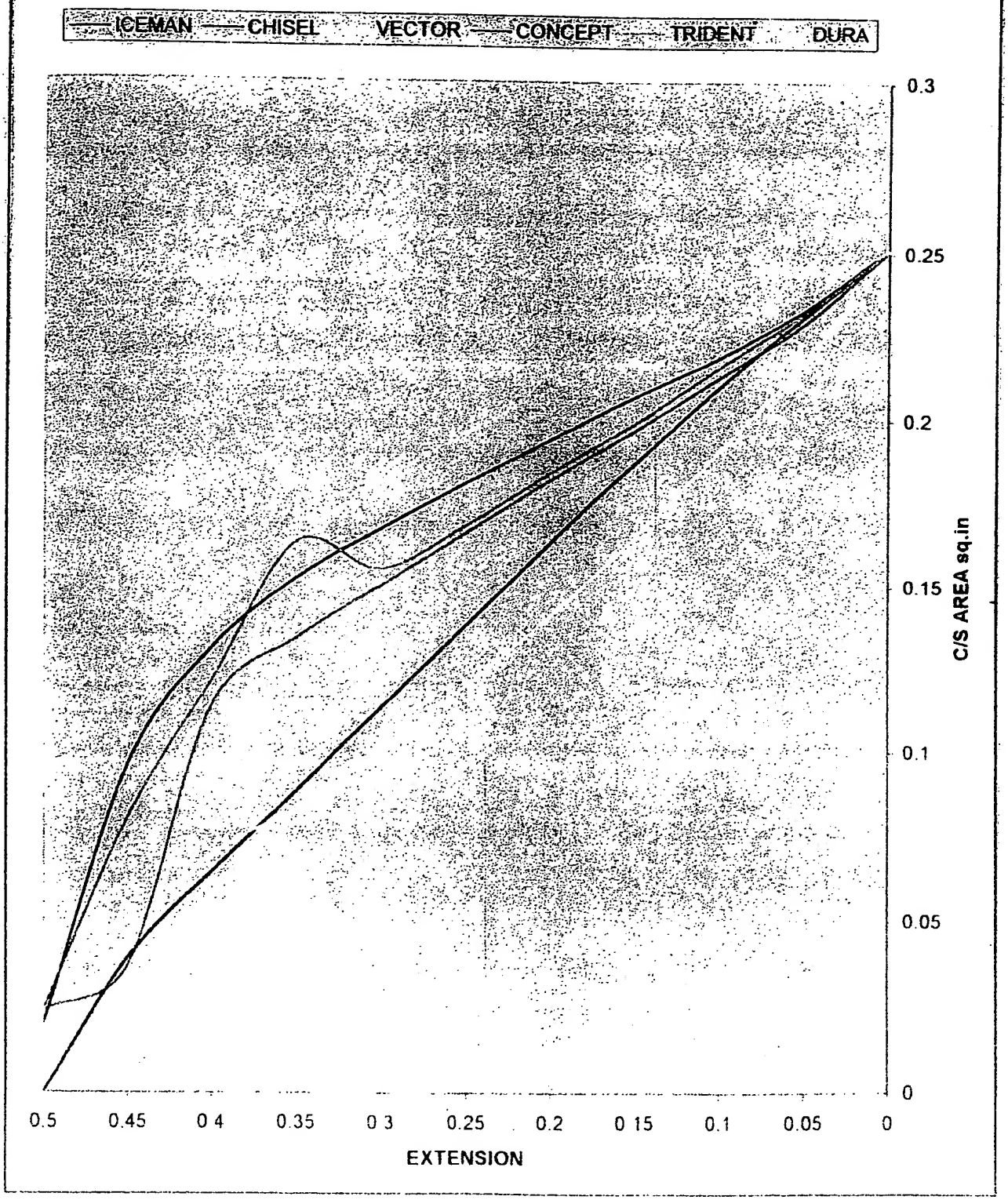
Surpassing The Target in Ductile Rock

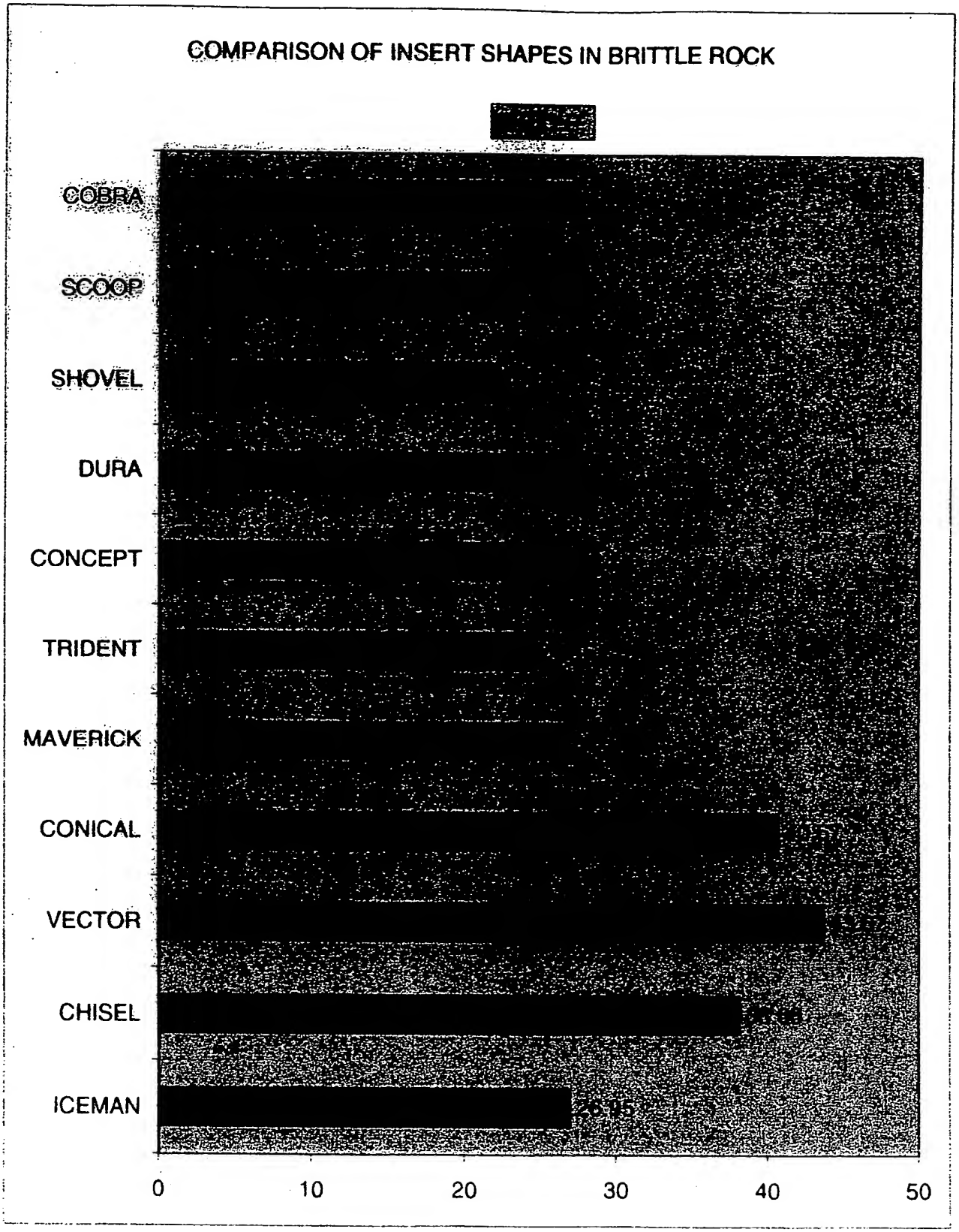
- INSERT SHAPES
  - R.O.P. = 12% Increase [Vector]
  - COVERAGE = 4% Increase [Vector]
- ROW COUNTS
  - R.O.P. = 16% Increase [-1 Insert on each row]
  - COVERAGE = 5% Increase [-1 Insert on each row]

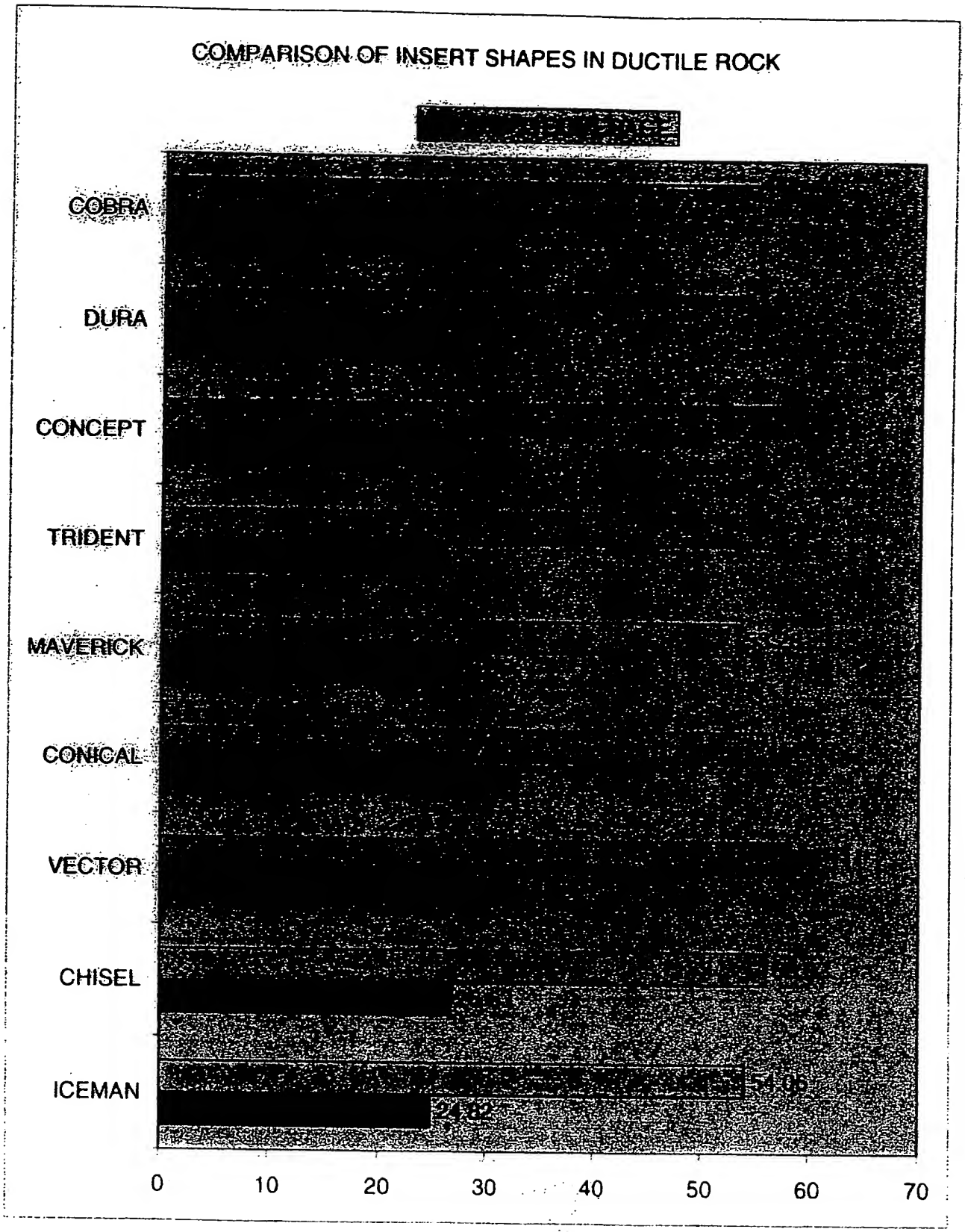

COMPARISON OF INSERT SHAPES IN BRITTLE ROCK
COBRA
DURA
MAVERICK
CONICAL
VECTOR
CHISEL
ICEMAN
0
10
20
30
40
50


COMPARISON OF INSERT SHAPES IN DUCTILE ROCK
COBRA
SCOOP
SHOVEL
DURA
CONCEPT
TRIDENT
MAVERICK
CONICAL
VECTOR
CHISEL
ICEMAN
21
22
23
24
25
26
27
28
29

CROSS-SECTION AREA FOR VARIOUS INSERTS

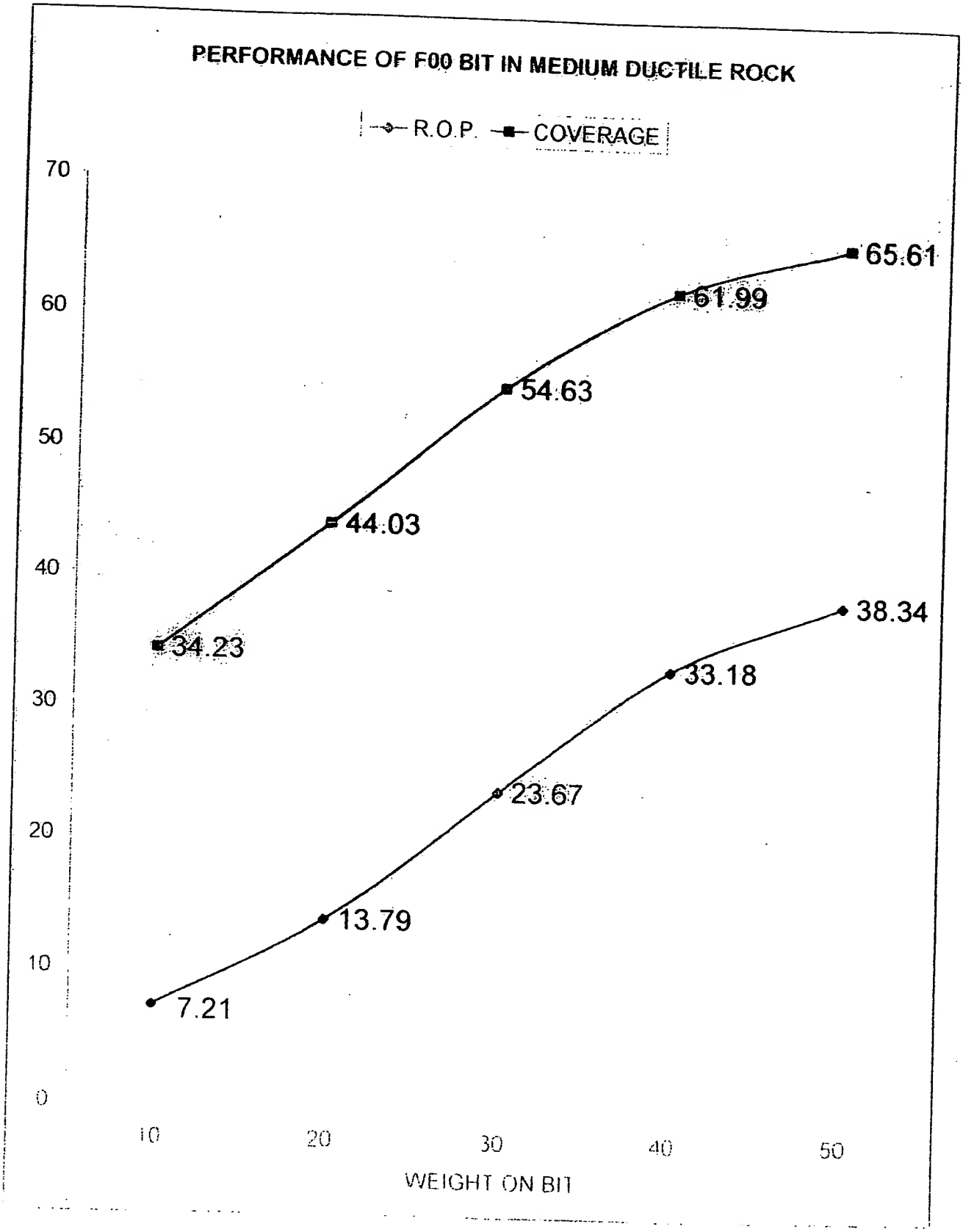


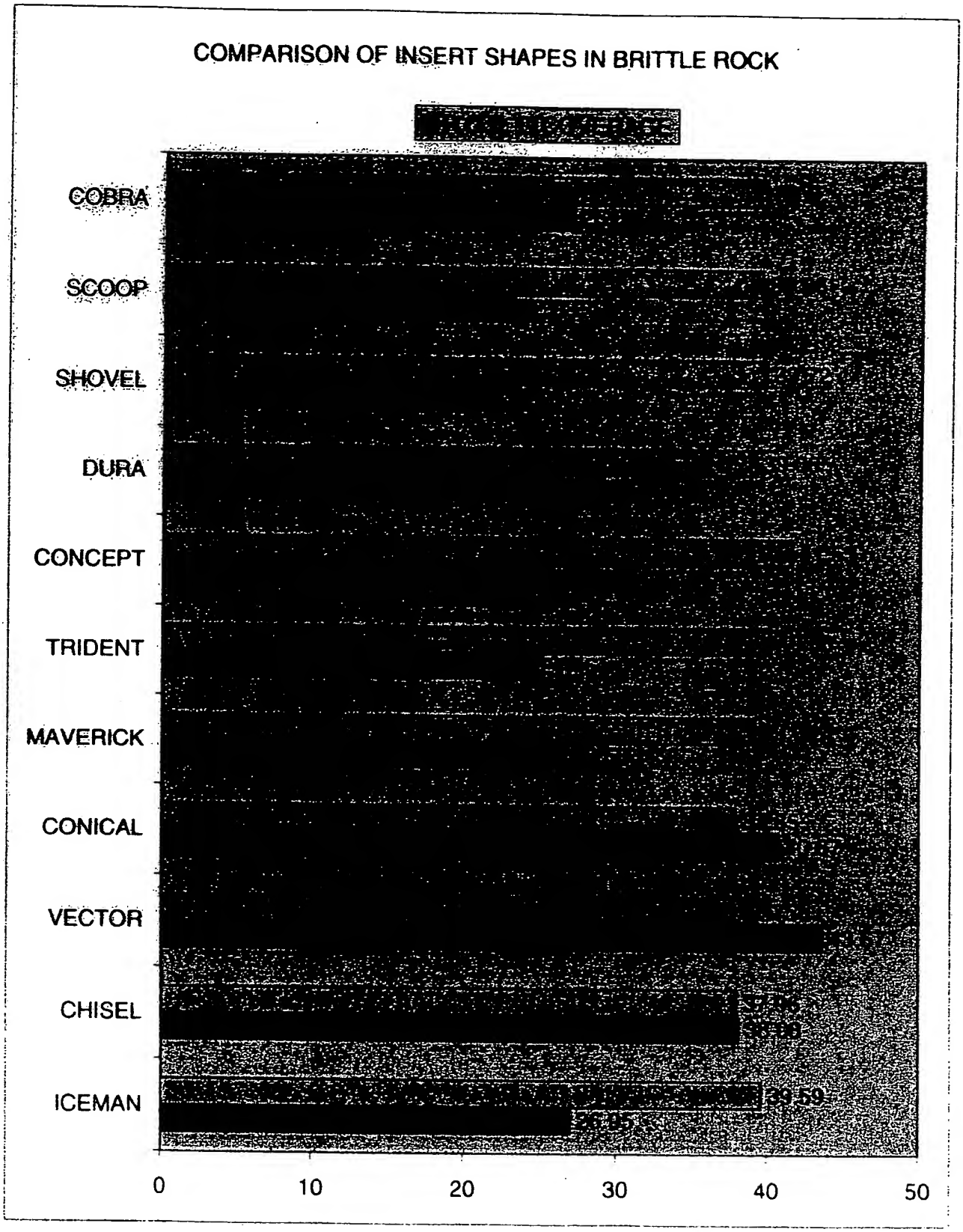

COMPARISON OF INSERT SHAPES IN BRITTLE ROCK
COBRA
SCOOP
SHOVEL
DURA
CONCEPT
TRIDENT
MAVERICK
CONICAL
VECTOR
CHISEL
ICEMAN
26.5
0
10
20
30
40
50

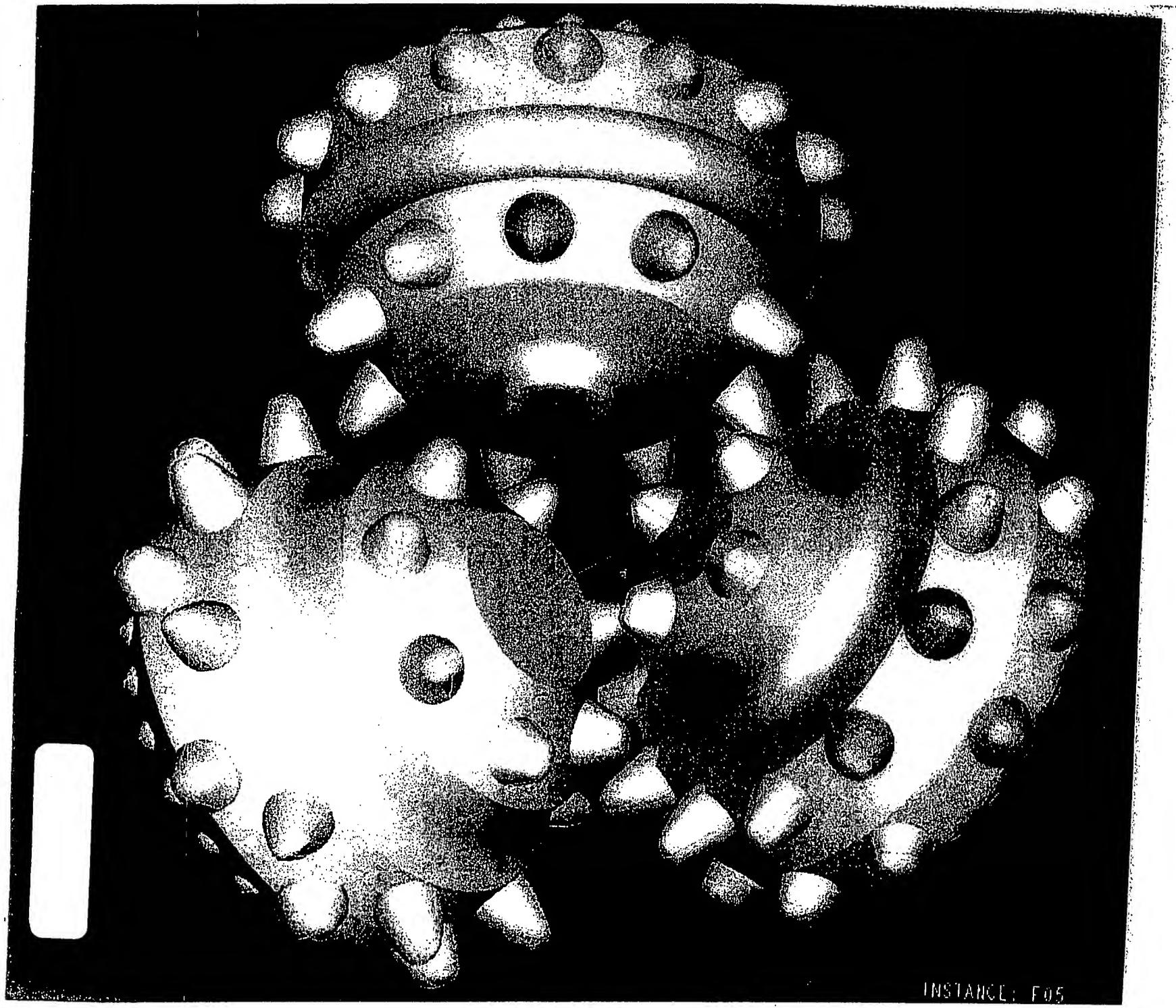

COMPARISON OF INSERT SHAPES IN DUCTILE ROCK
COBRA
DURA
CONCEPT
TRIDENT
MAVERICK
CONICAL
VECTOR
CHISEL
ICEMAN
54.06
24.82
0
10
20
30
40
50
60
70

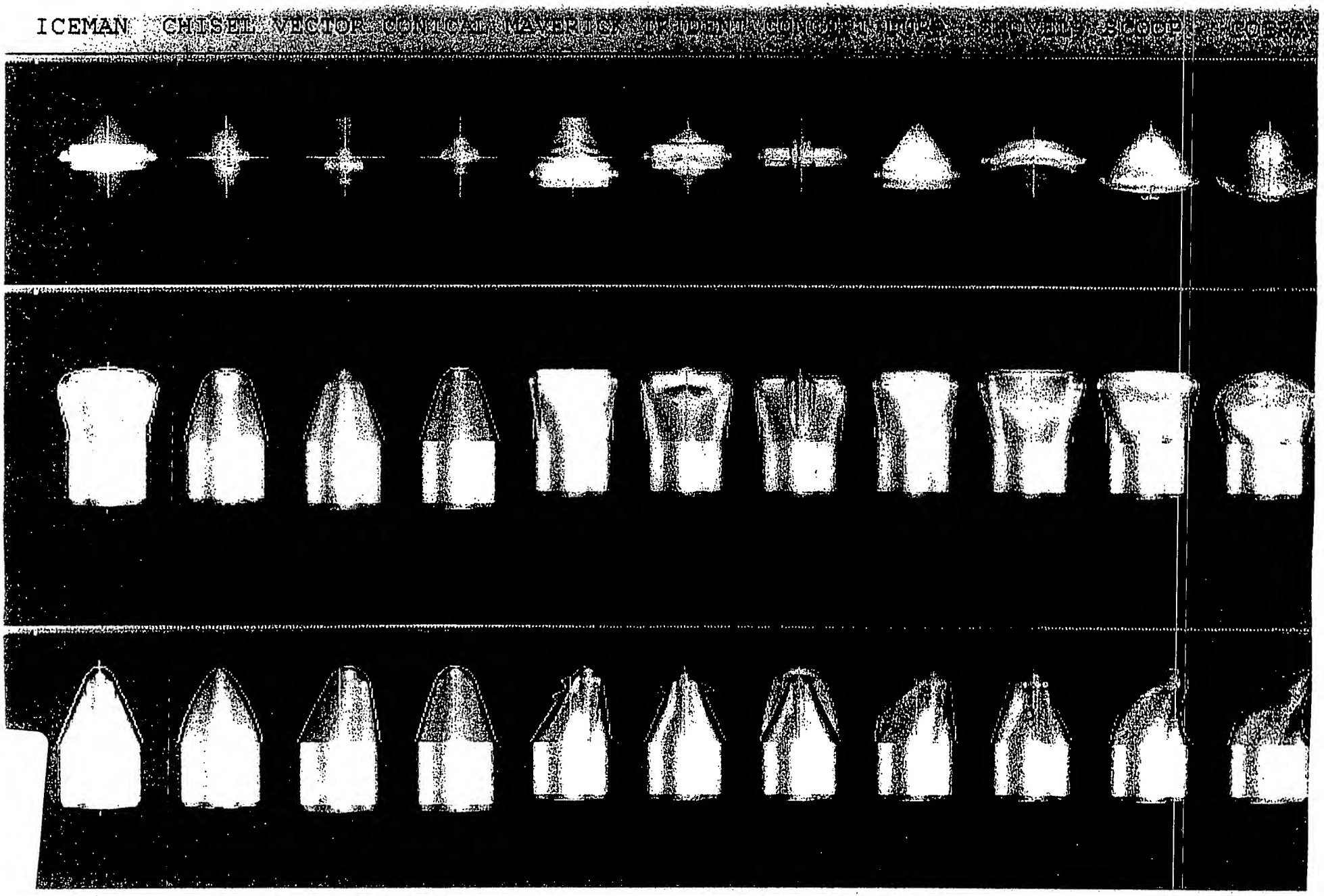
Program validation and development

- Duplicating field results
  - W.O.B.= 7-13 kdAN
  - R.P.M.=80-240 rpm
  - R.O.P.=35 m/hr
- IDEAS Parameters & Results
  - Rock Types
    - Ductile
    - Brittle
  - W.O.B.=10,000 kg-f
  - R.P.M.=140 rpm
  - R.O.P.=24-28 m/hr
- Verifying performance trends

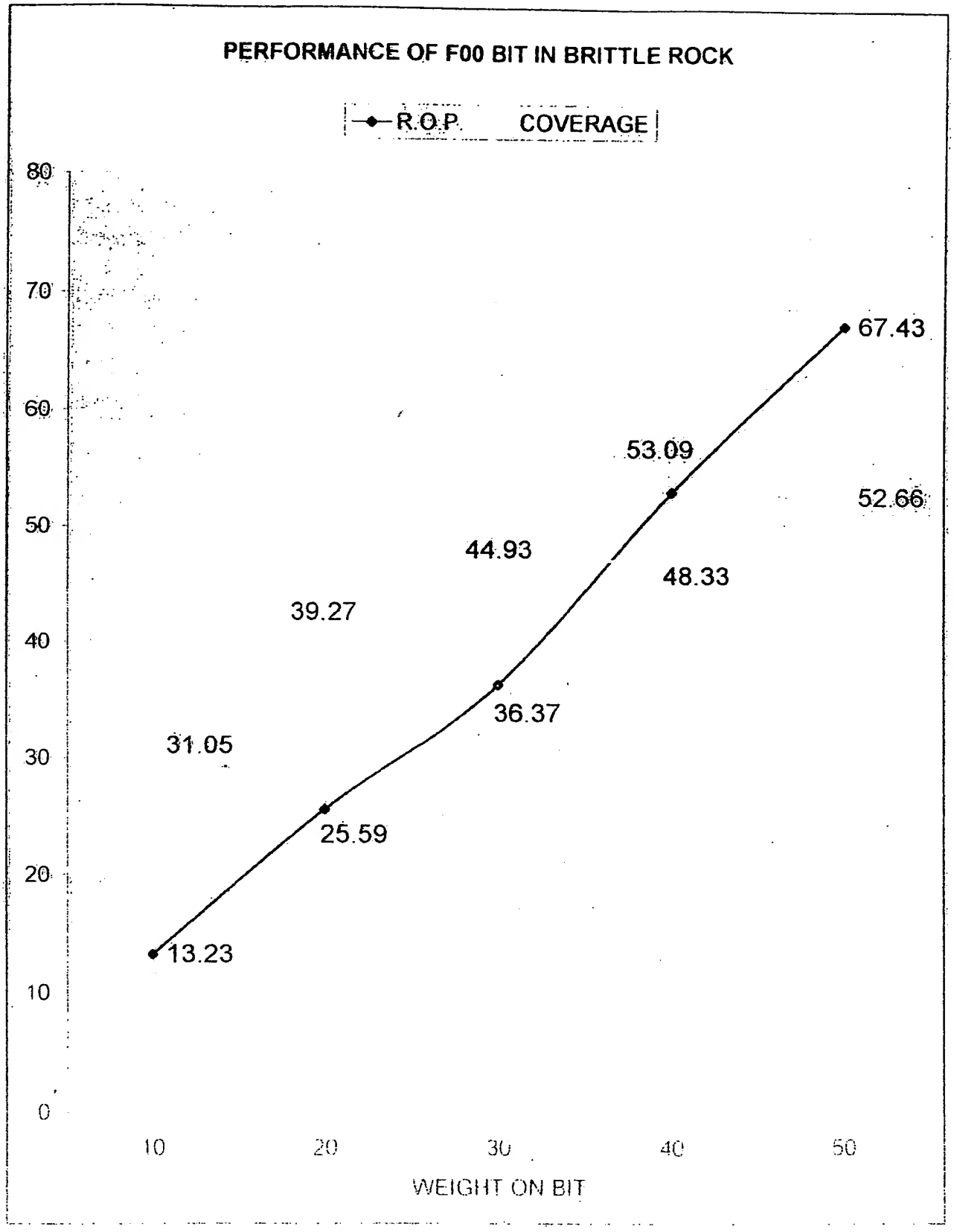

PERFORMANCE OF F00 BIT IN MEDIUM DUCTILE ROCK
R.O.P.
COVERAGE
70
60
50
40
30
20
10
0
65.61
61.99
54.63
44.03
34.23
38.34
33.18
23.67
13.79
7.21
10
20
30
40
50
WEIGHT ON BIT


COMPARISON OF INSERT SHAPES IN BRITTLE ROCK
COBRA
SCOOP
SHOVEL
DURA
CONCEPT
TRIDENT
MAVERICK
CONICAL
VECTOR
CHISEL
ICEMAN
39.59
0
10
20
30
40
50

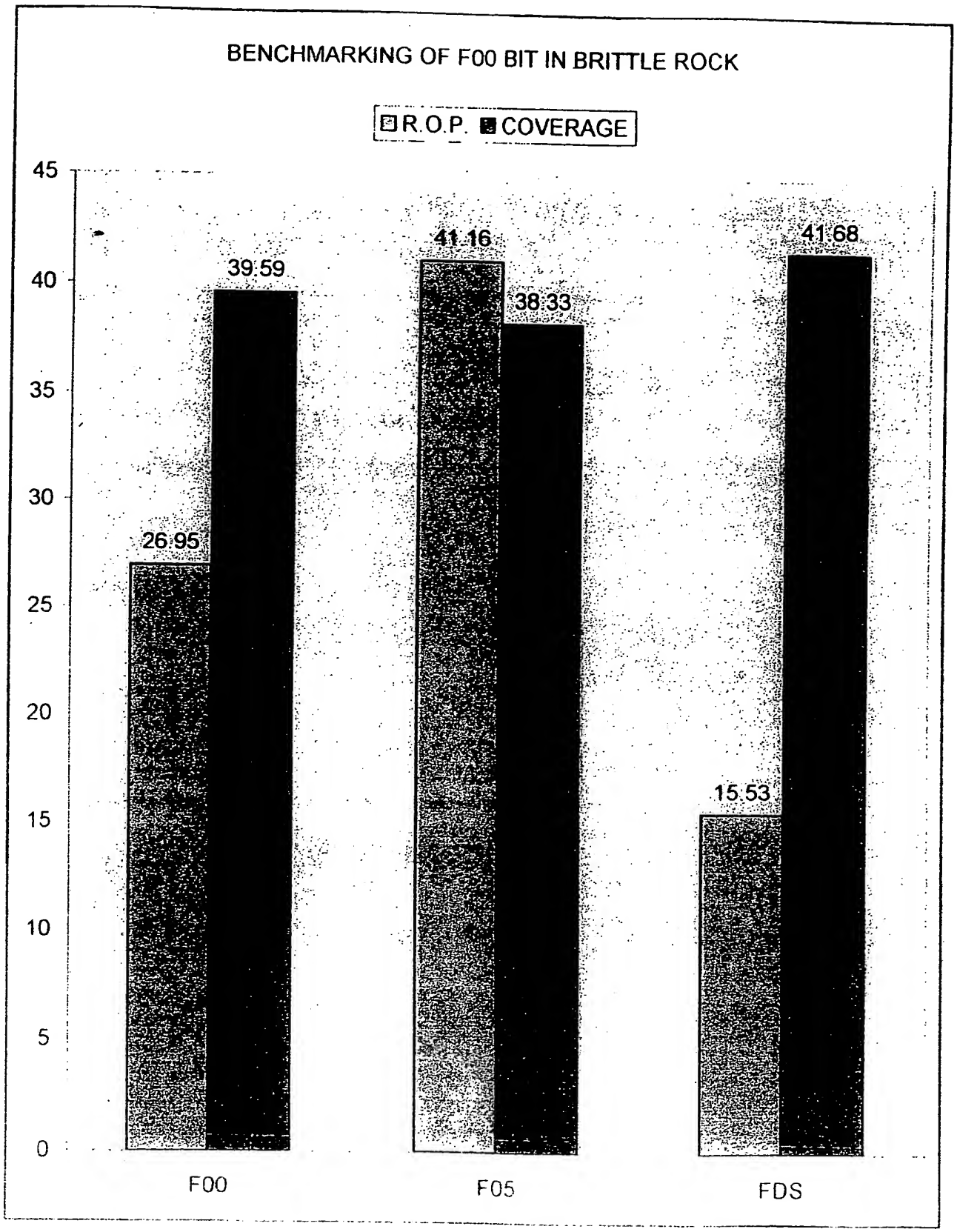

INSTANCE: F05

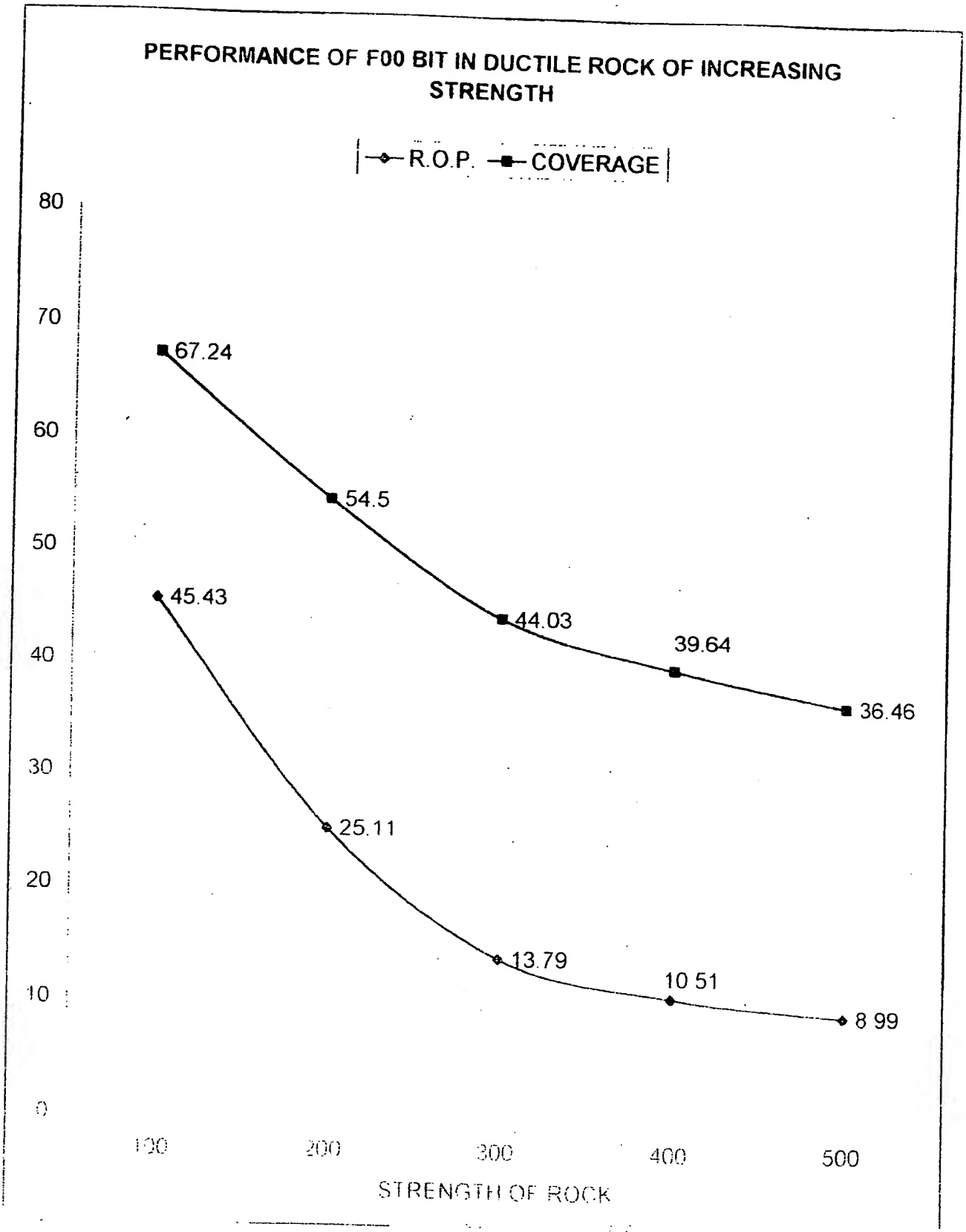

ICEMAN CHISEL VECTOR CONICAL MAVERICK HYBRID CONCAVE HUBRIS RETRIEVAL SCOOP COBRA

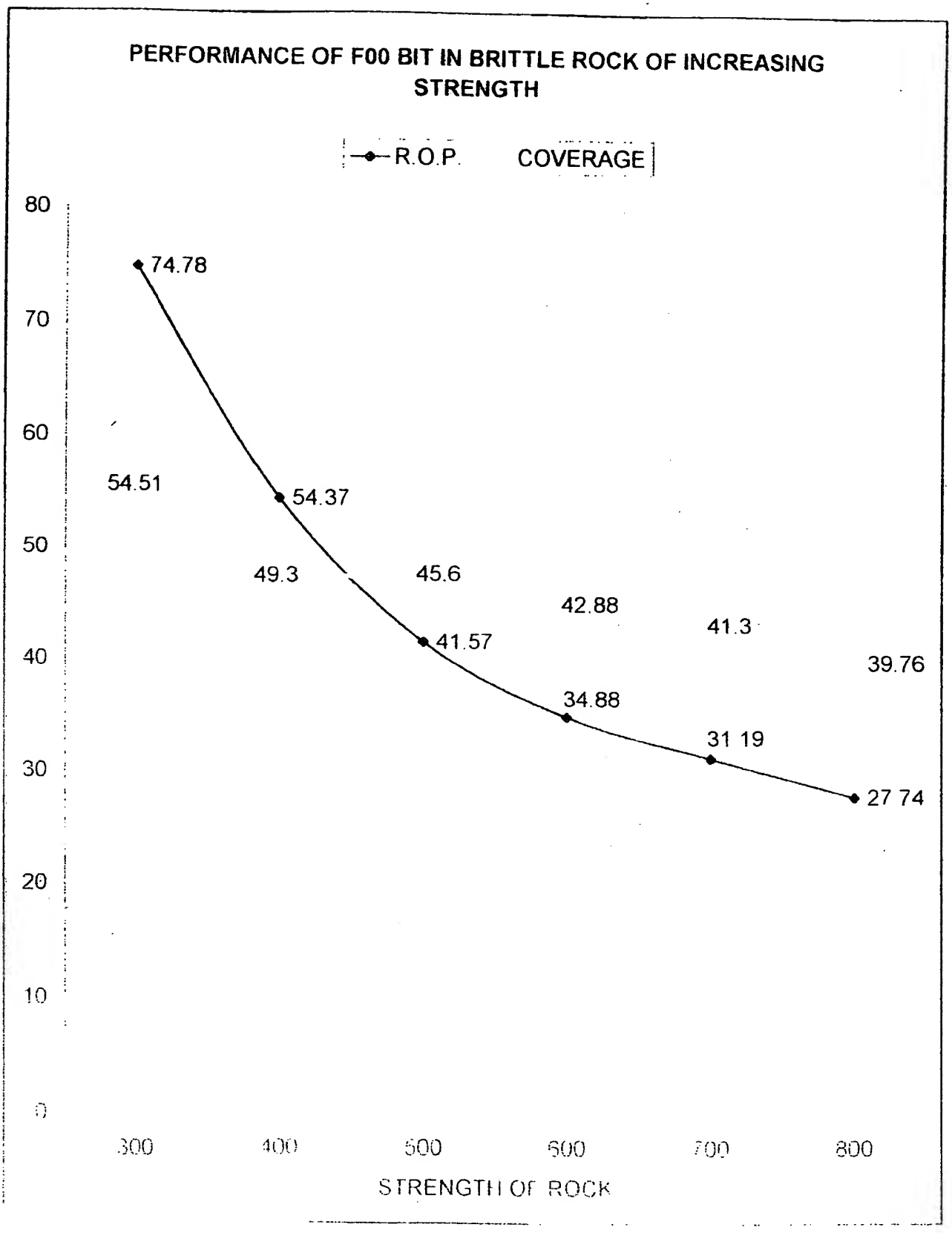
Rotx
Roty
Dolly
?


PERFORMANCE OF F00 BIT IN BRITTLE ROCK
R.O.P.
COVERAGE
80
70
60
50
40
30
20
10
0
10
20
30
40
50
WEIGHT ON BIT
13.23
25.59
31.05
36.37
39.27
44.93
48.33
53.09
52.66
67.43

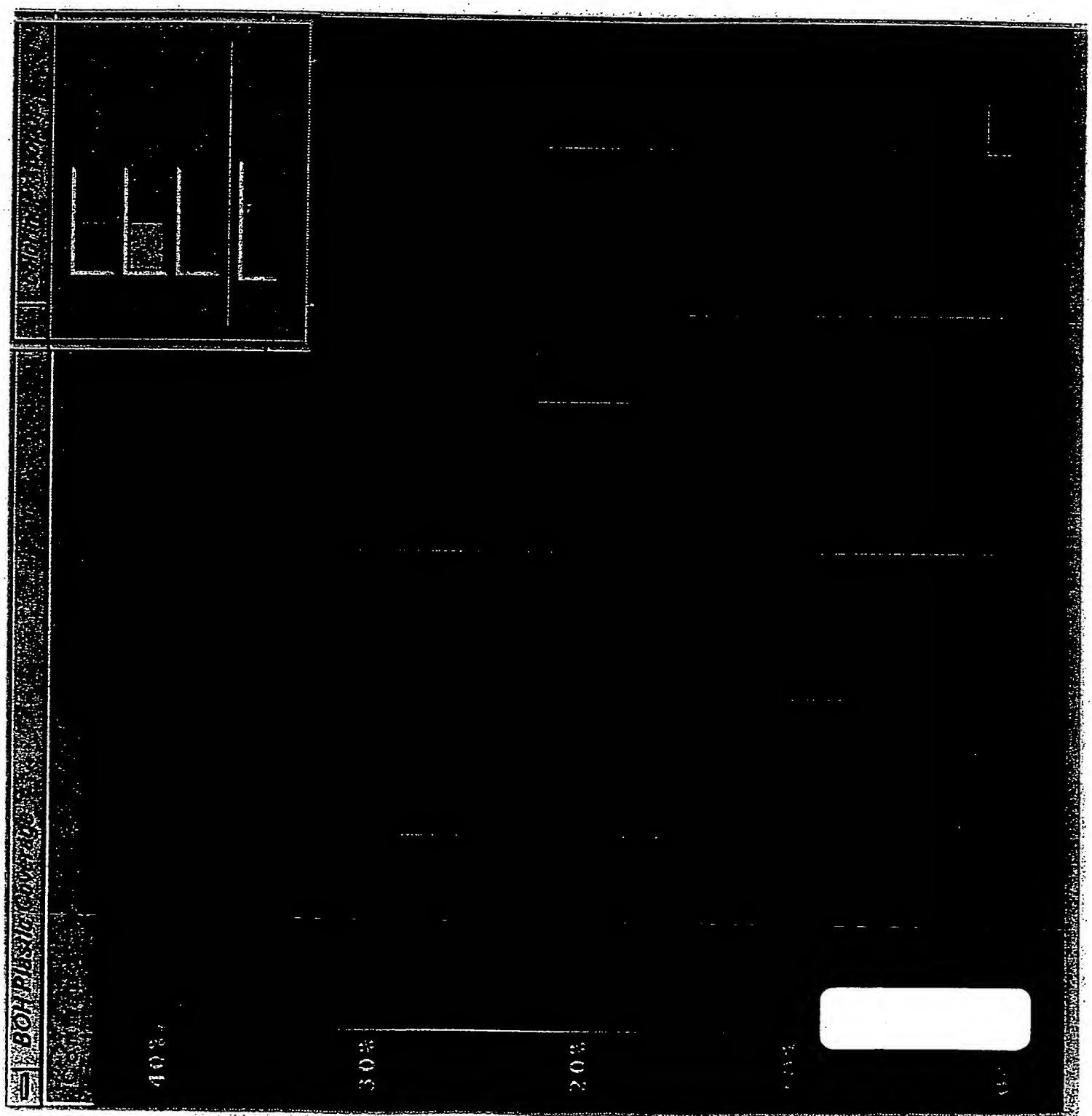
File
Options
Optimize

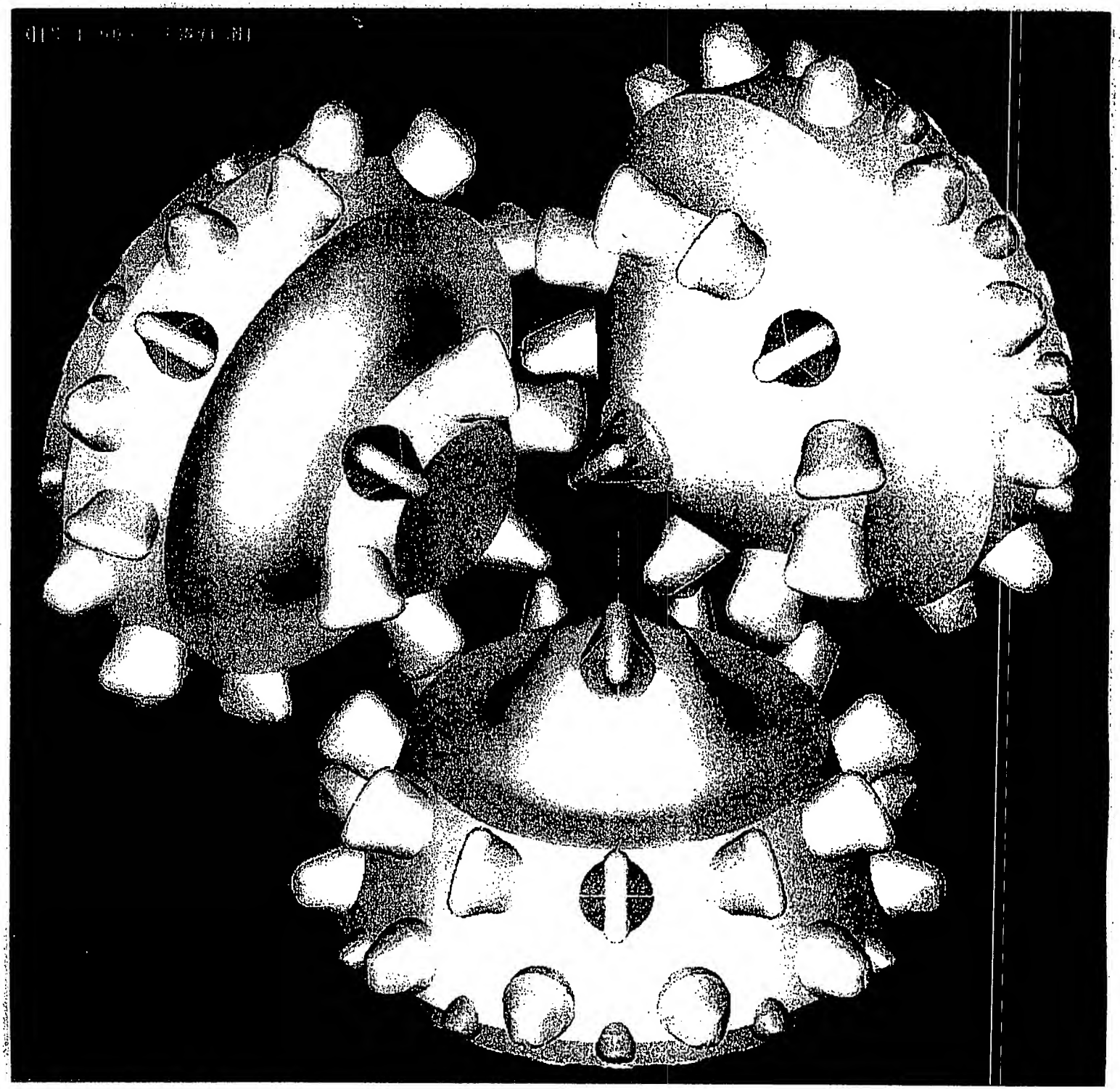

BENCHMARKING OF F00 BIT IN BRITTLE ROCK
R.O.P.
COVERAGE
45
40
35
30
25
20
15
10
5
0
26.95
39.59
41.16
38.33
15.53
41.68
F00
F05
FDS

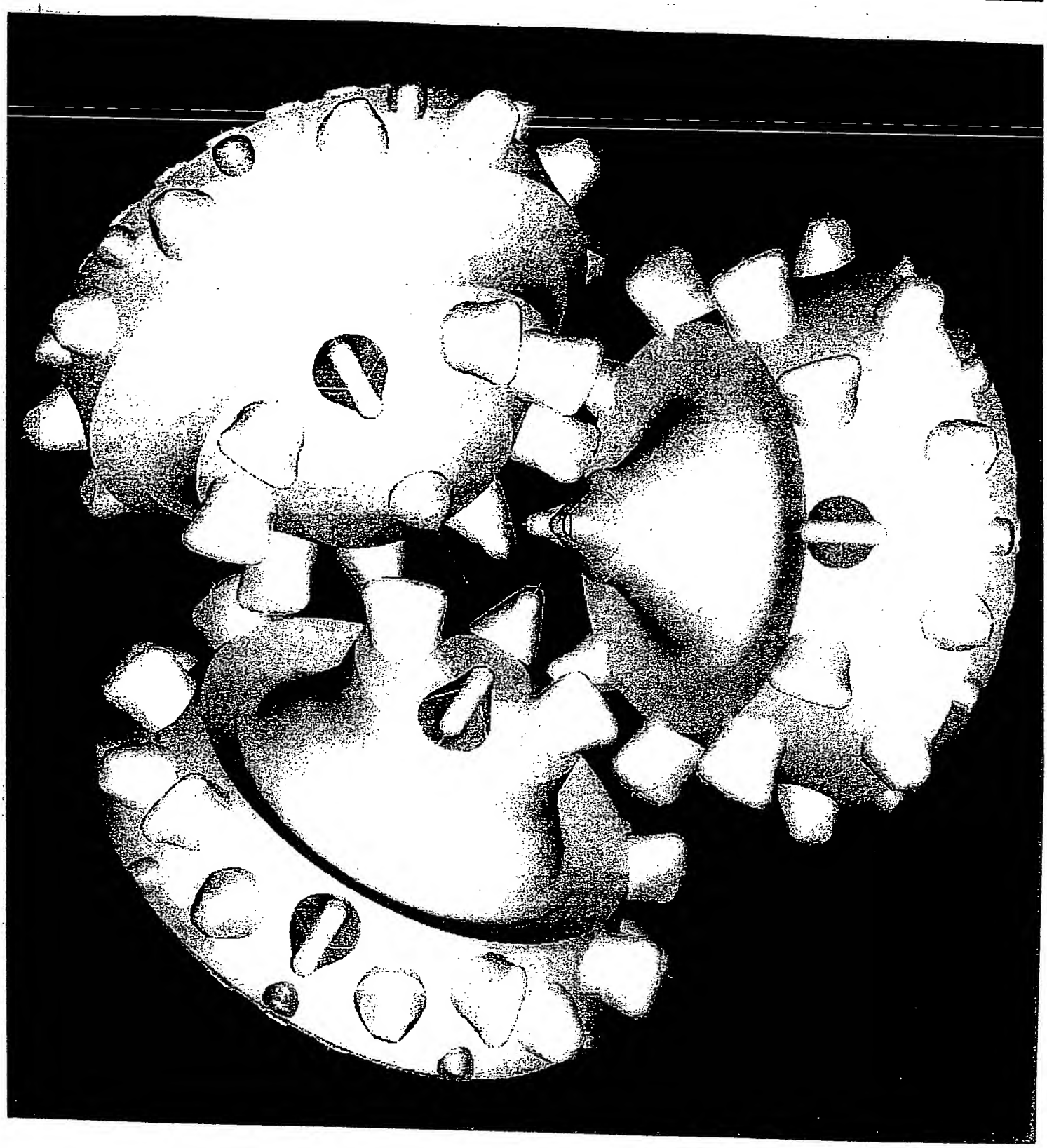

PERFORMANCE OF F00 BIT IN DUCTILE ROCK OF INCREASING STRENGTH
R.O.P.
COVERAGE
80
70
60
50
40
30
20
10
0
67.24
54.5
44.03
39.64
36.46
45.43
25.11
13.79
10 51
8 99
100
200
300
400
500
STRENGTH OF ROCK

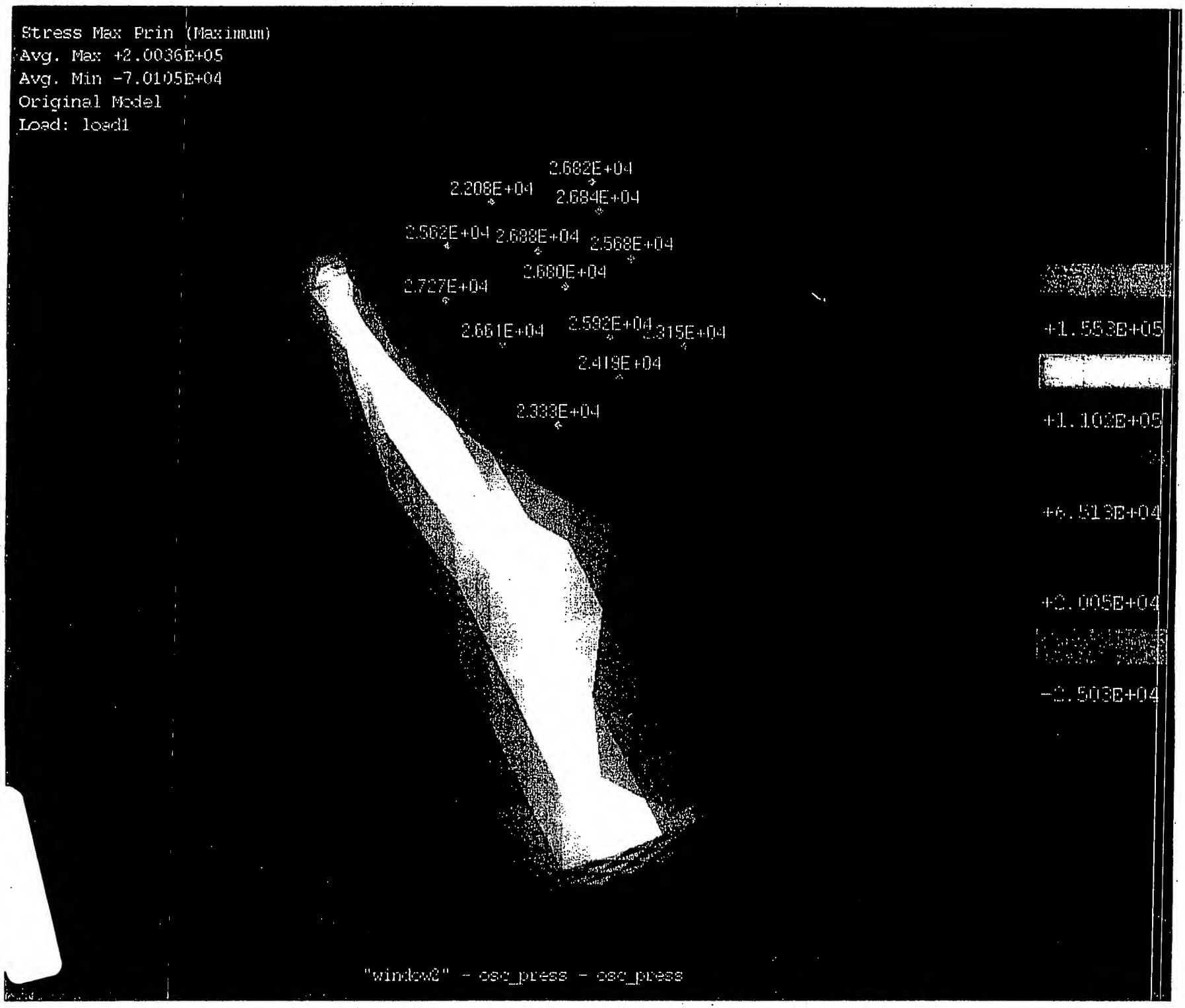

PERFORMANCE OF F00 BIT IN BRITTLE ROCK OF INCREASING STRENGTH
R.O.P.
COVERAGE
80
70
60
50
40
30
20
10
0
74.78
54.51
54.37
49.3
45.6
42.88
41.3
41.57
39.76
34.88
31 19
27 74
300
400
500
600
700
800
STRENGTH OF ROCK

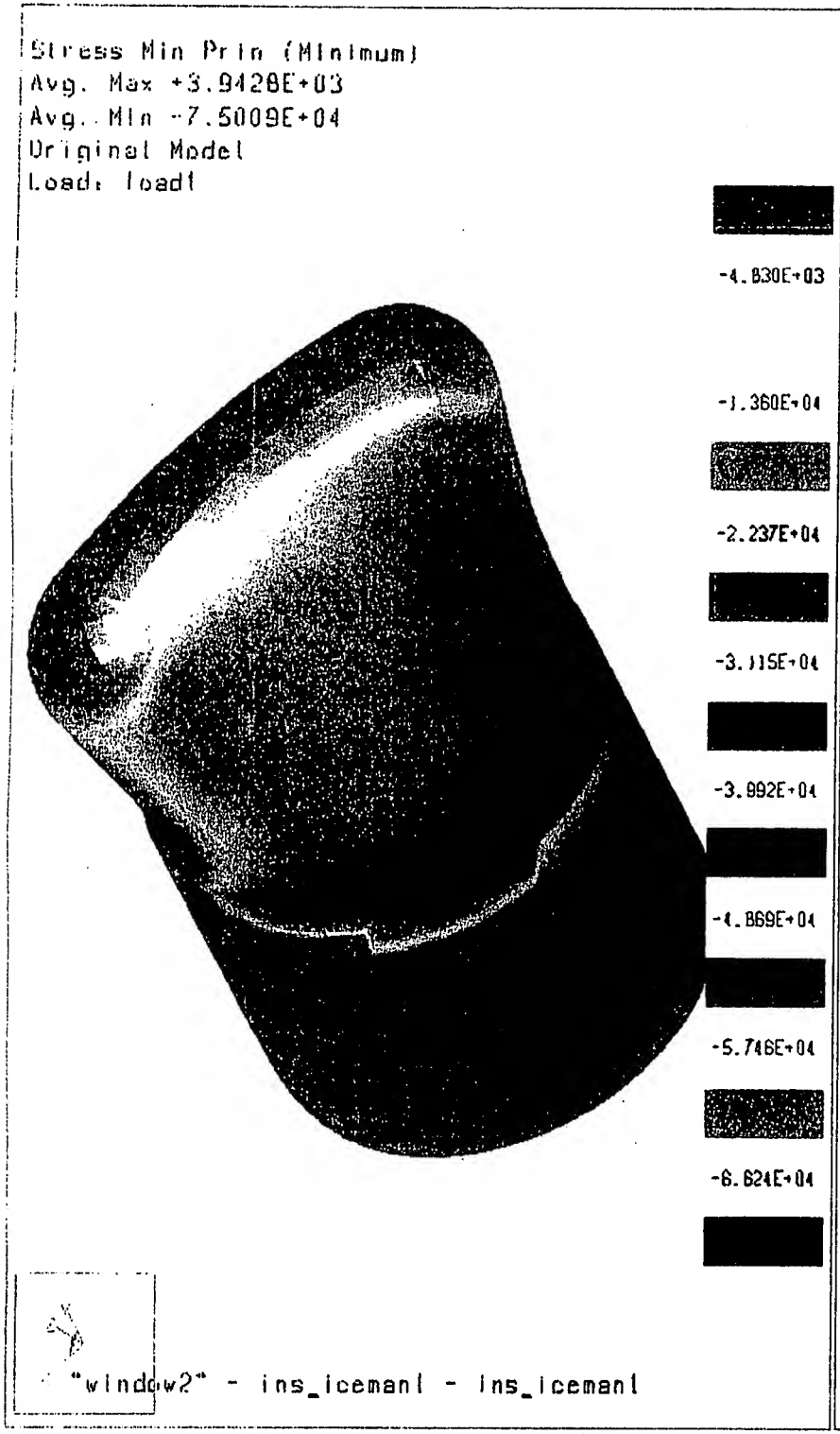
BIT TYPE: *F90-1 STP*
ROCK: DUCTILE

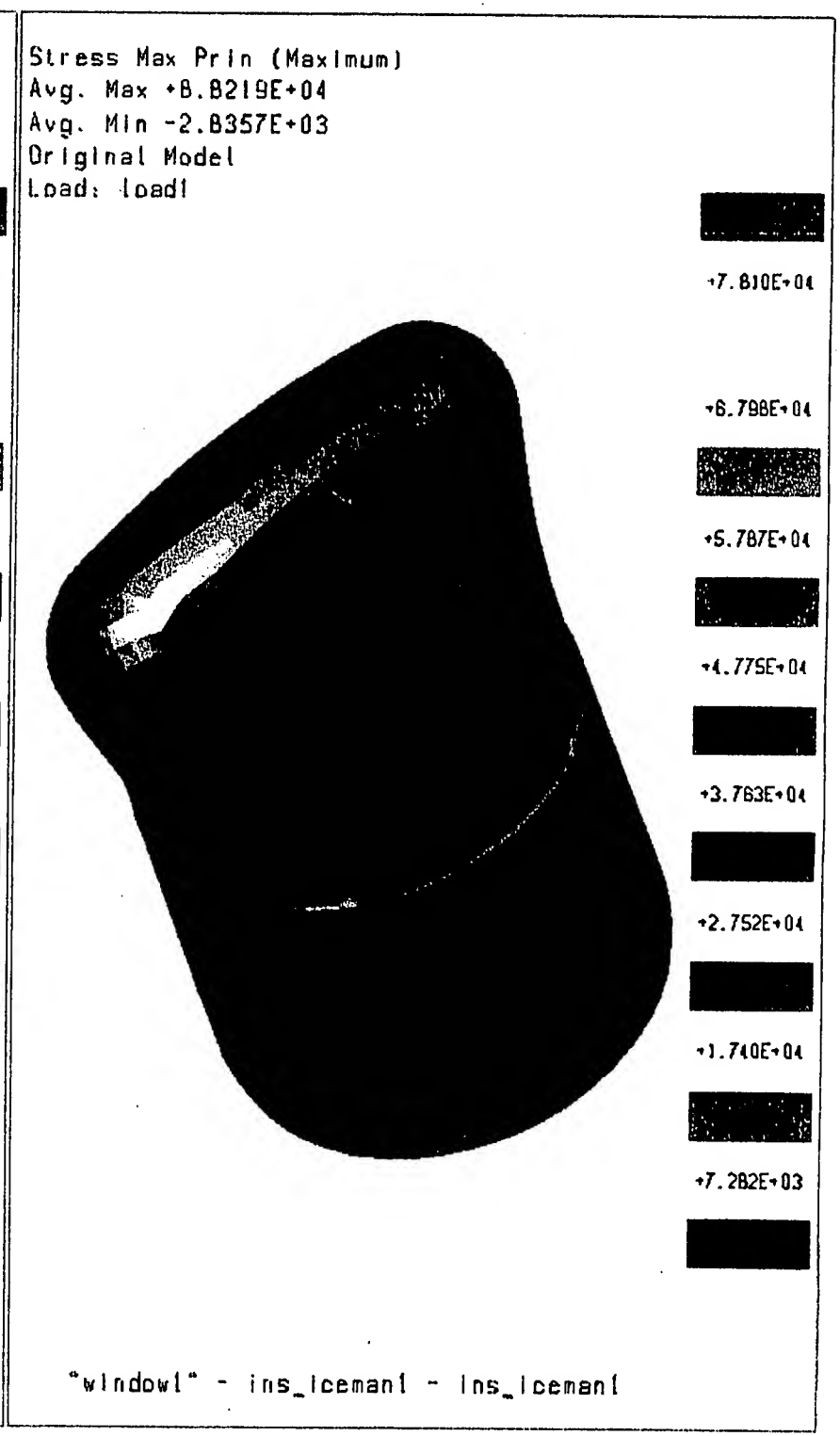




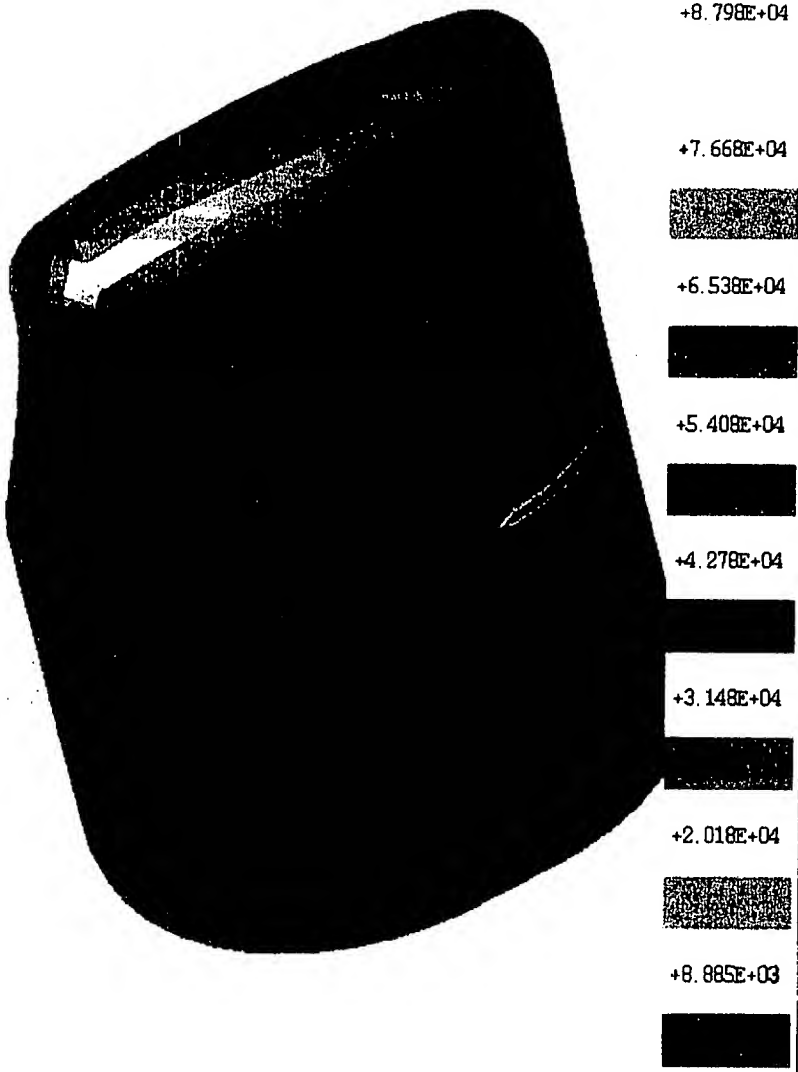



Stress Max Prin (Maximum)
Avg. Max +2.0036E+05
Avg. Min -7.0105E+04
Original Model
Load: load1
2.682E+04
2.208E+04
2.684E+04
2.562E+04
2.688E+04
2.568E+04
2.680E+04
2.727E+04
2.661E+04
2.592E+04
2.315E+04
2.419E+04
2.333E+04
+1.553E+05
+1.102E+05
+6.513E+04
+2.005E+04
-2.503E+04
"window2" - osc_press - osc_press


Stress Min Prin (Minimum)
Avg. Max +3.9428E+03
Avg. Min -7.5009E+04
Original Model
Load: load1
-4.830E+03
-1.360E+04
-2.237E+04
-3.115E+04
-3.992E+04
-4.869E+04
-5.746E+04
-6.624E+04
"window2" - ins_iceman1 - ins_iceman1


Stress Max Prin (Maximum)
Avg. Max +8.8219E+04
Avg. Min -2.8357E+03
Original Model
Load: load1
+7.810E+04
+6.798E+04
+5.787E+04
+4.775E+04
+3.763E+04
+2.752E+04
+1.740E+04
+7.282E+03
"window1" - ins_iceman1 - ins_iceman1

Stress Max Prin (Maximum)
Avg. Max +9.9275E+04
Avg. Min -2.4143E+03
Original Model
Load: load1



+8.798E+04
+7.668E+04
+6.538E+04
+5.408E+04
+4.278E+04
+3.148E+04
+2.018E+04
+8.885E+03

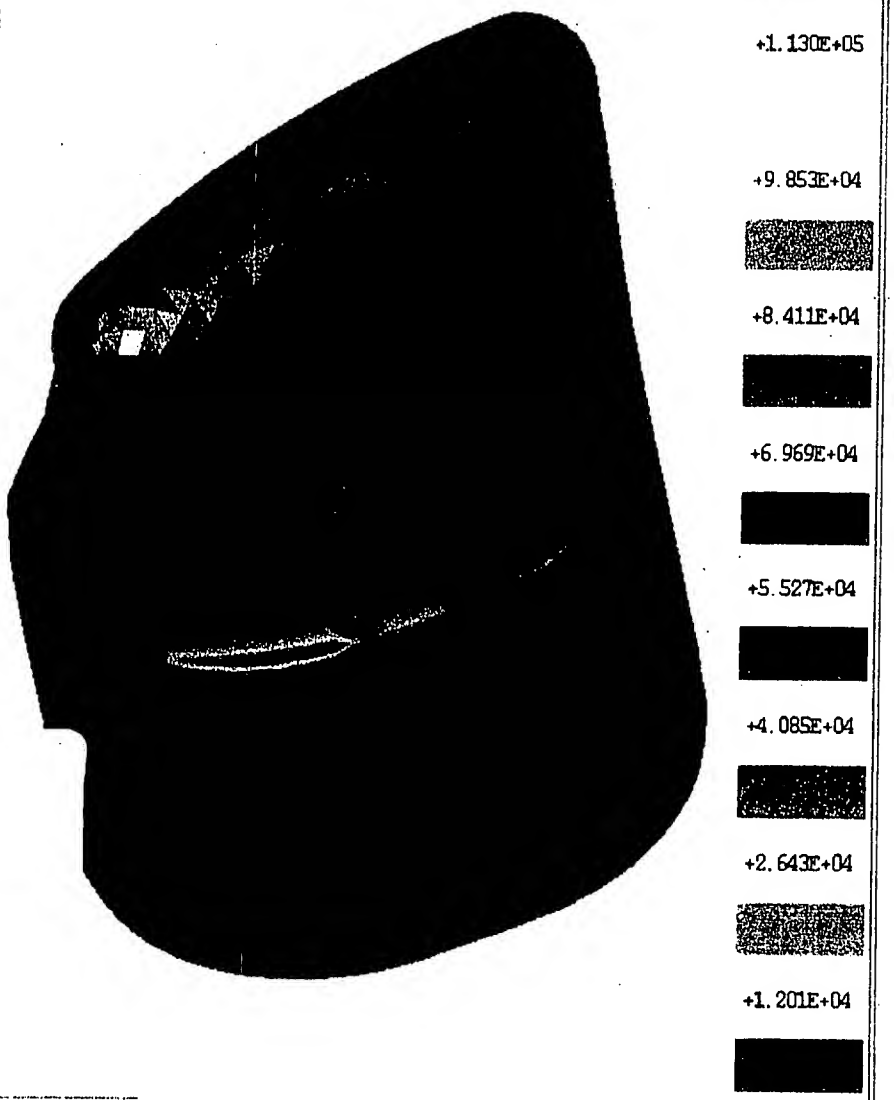
"window1" - OFFSET - OFFSET

Stress Min Prin (Minimum)
Avg. Max +6.2710E+03
Avg. Min -4.8760E+04
Original Model
Load: load1

+1.565E+02
-5.958E+03
-1.207E+04
-1.819E+04
-2.430E+04
-3.042E+04
-3.653E+04
-4.265E+04

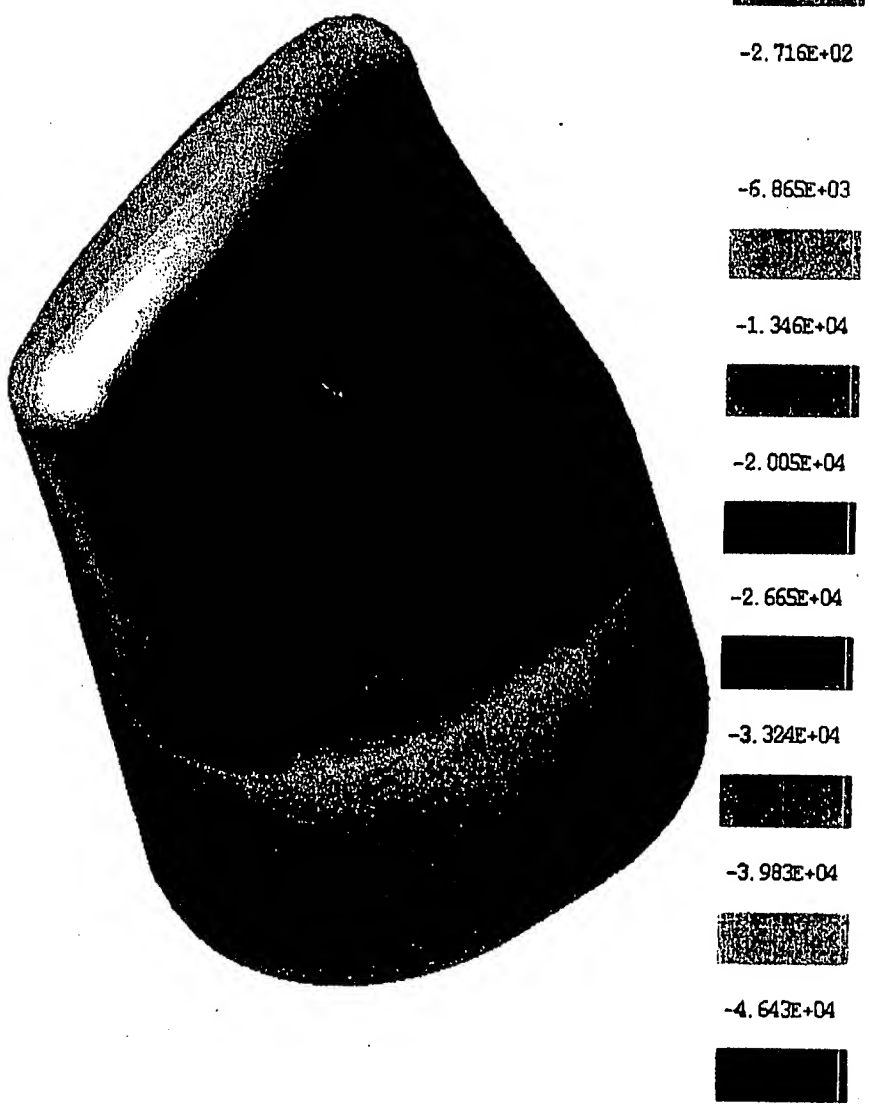
"window2" - OFFSET - OFFSET

Stress Max Prin (Maximum)
Avg. Max +1.2738E+05
Avg. Min -2.4160E+03
Original Model
Load: load1

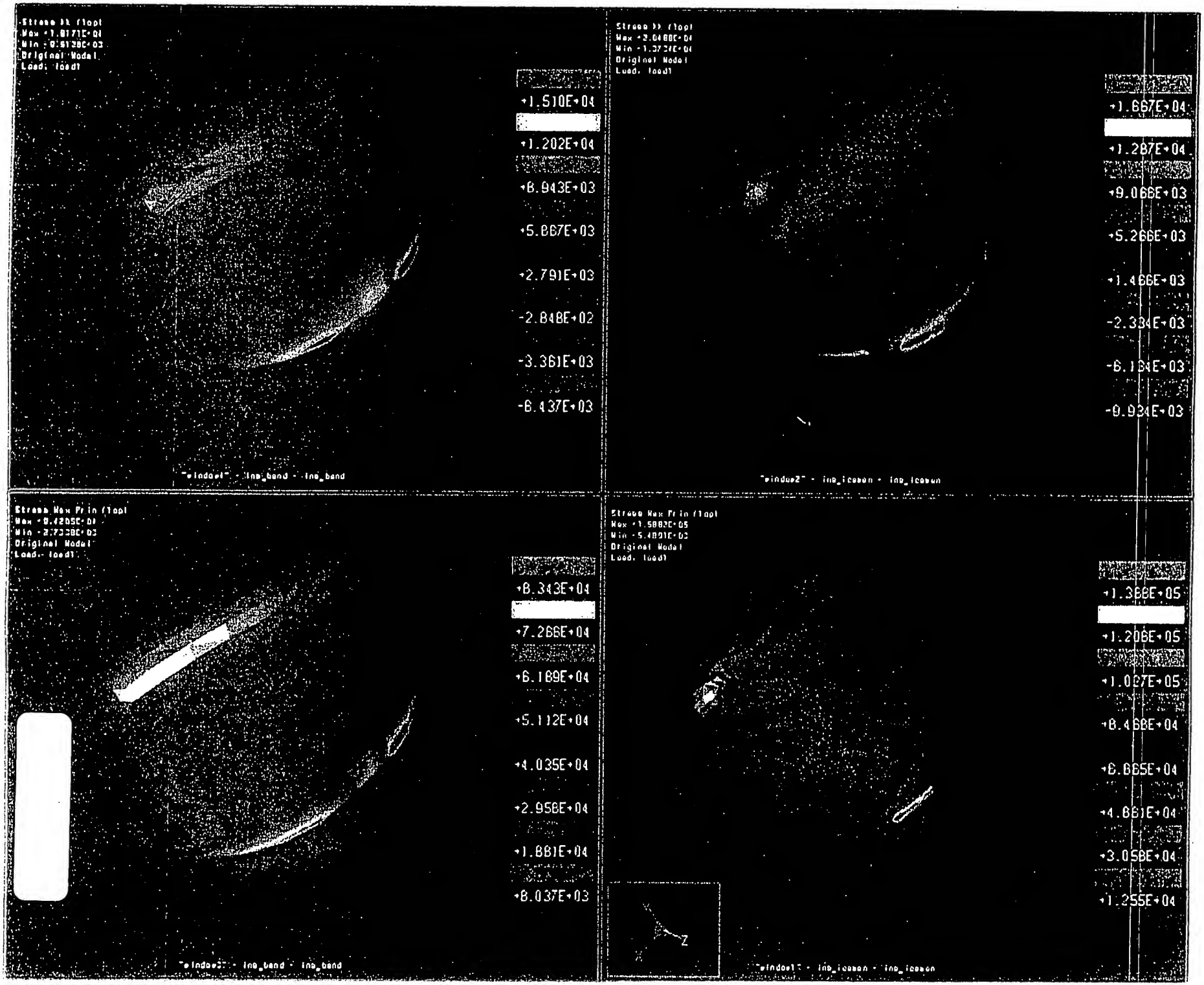


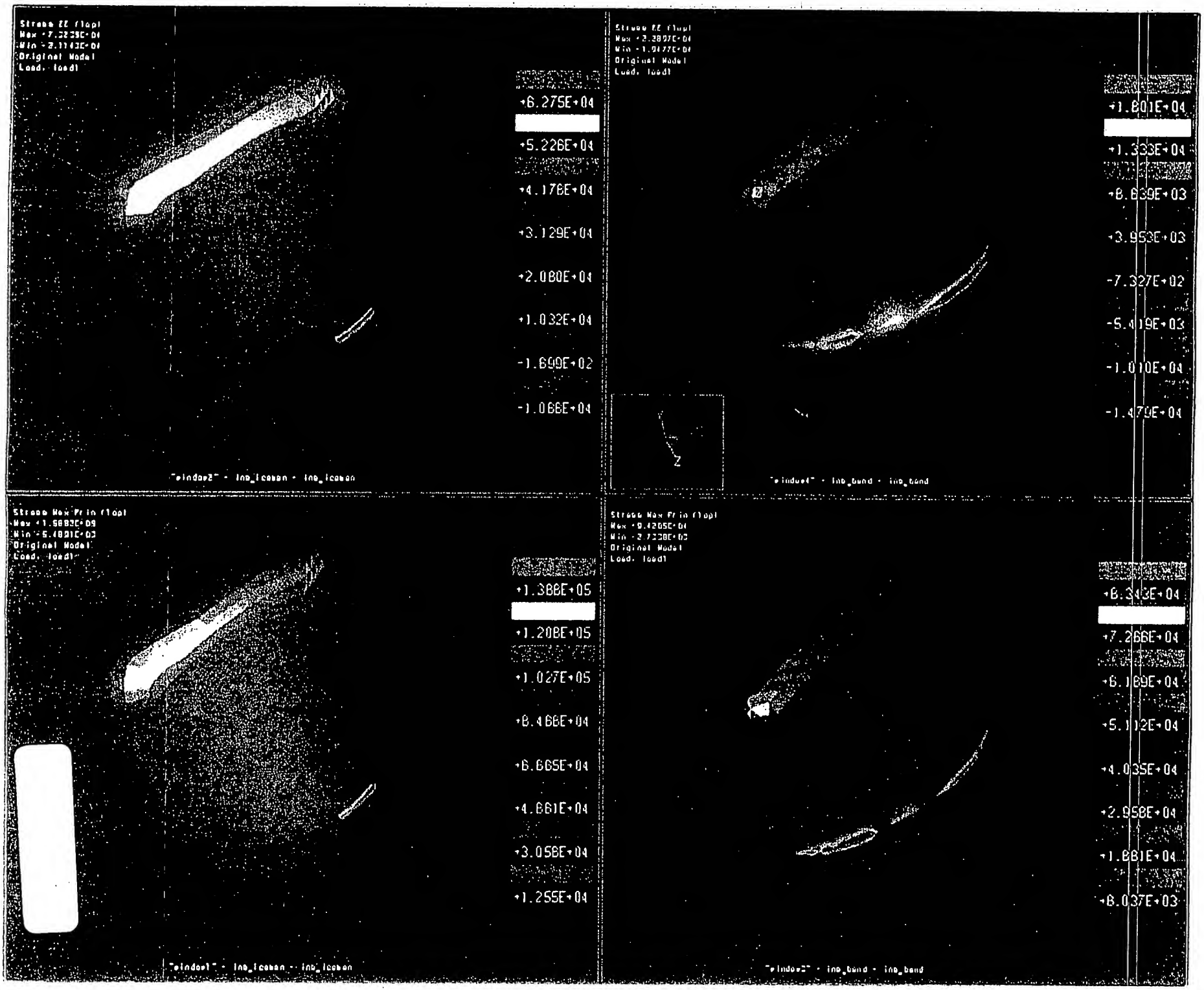
"window1" - ins_bend_0 - ins_bend_0

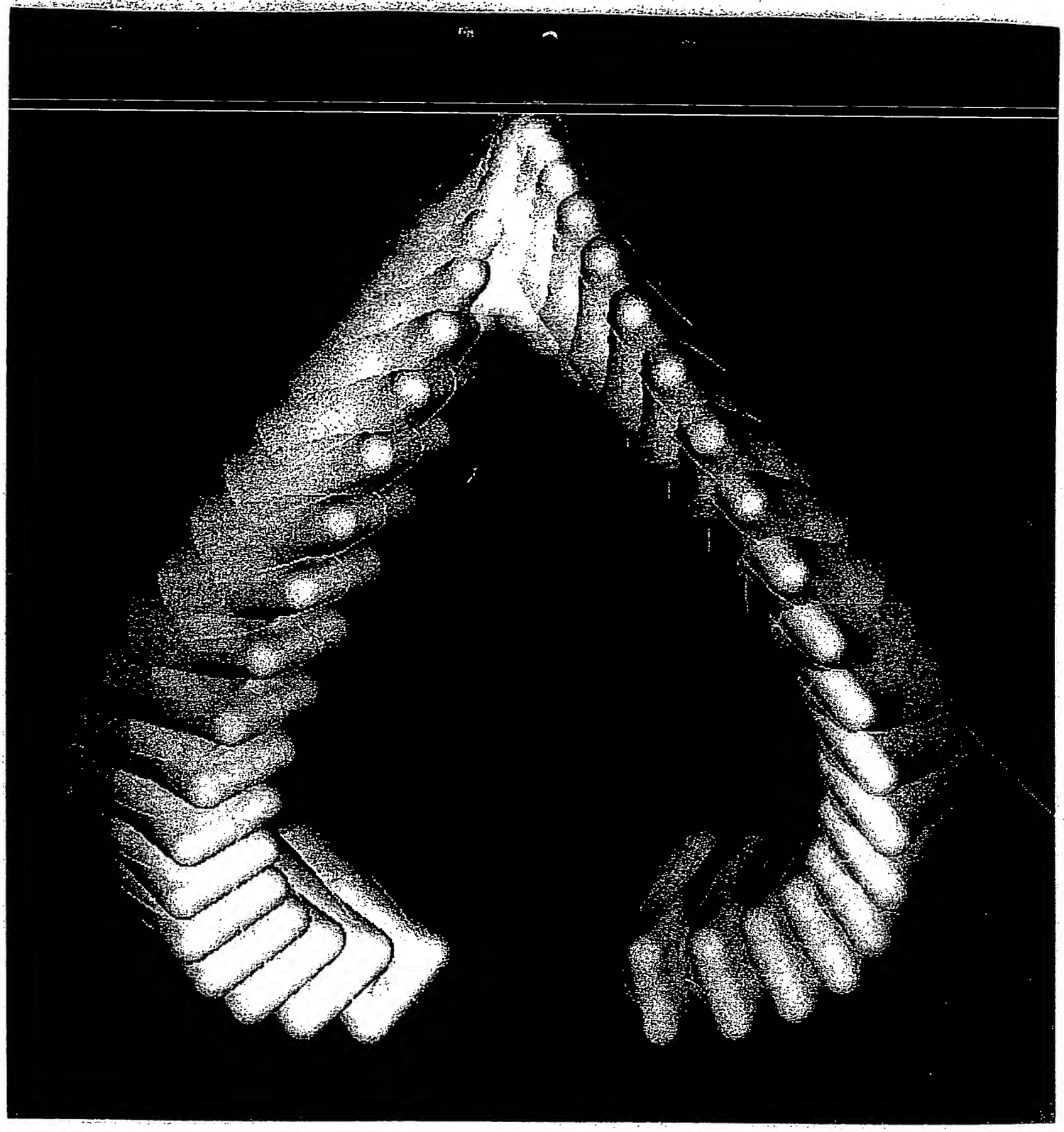
Stress Min Prin (Minimum)
Avg. Max +6.3221E+03
Avg. Min -5.3021E+04
Original Model
Load: load1

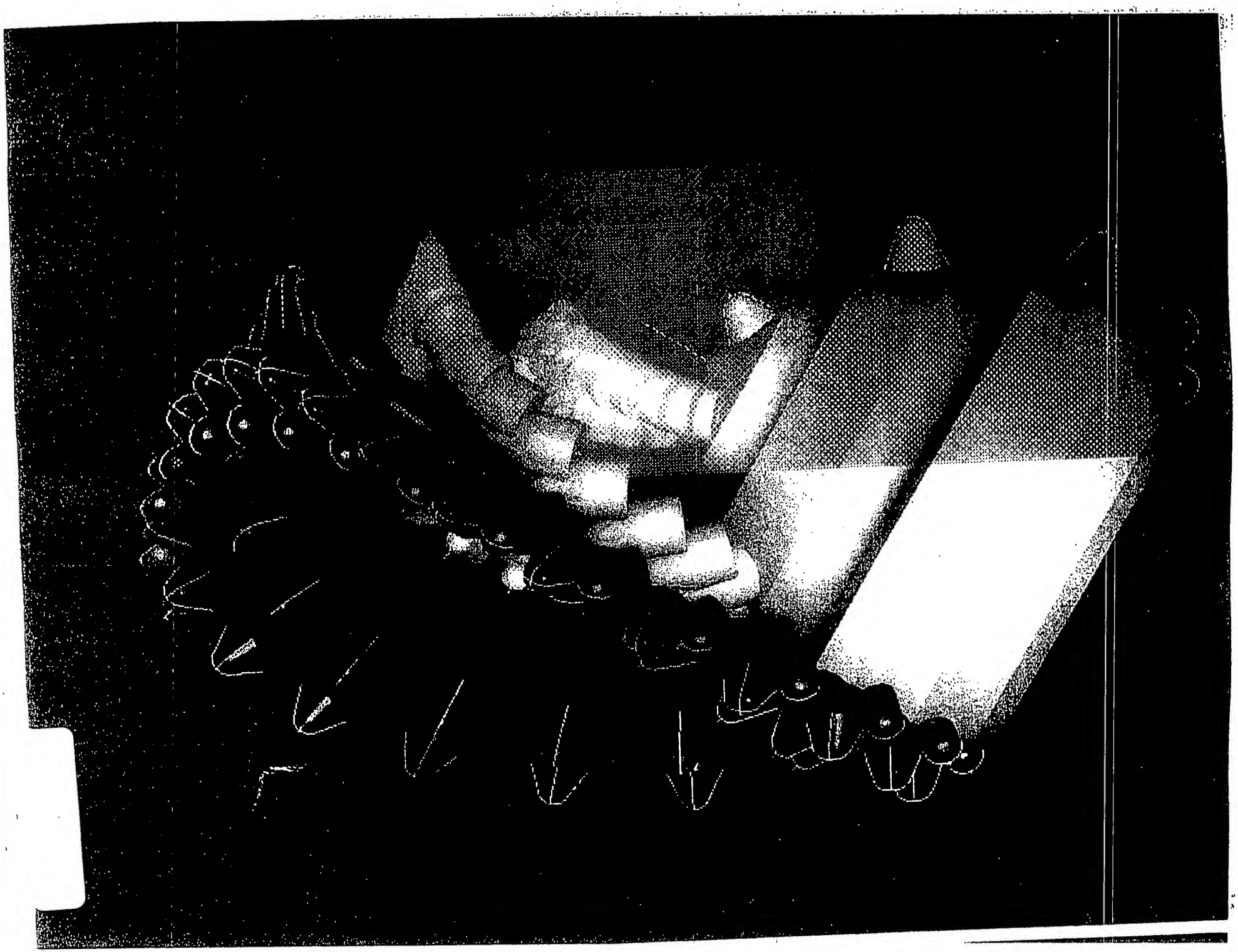


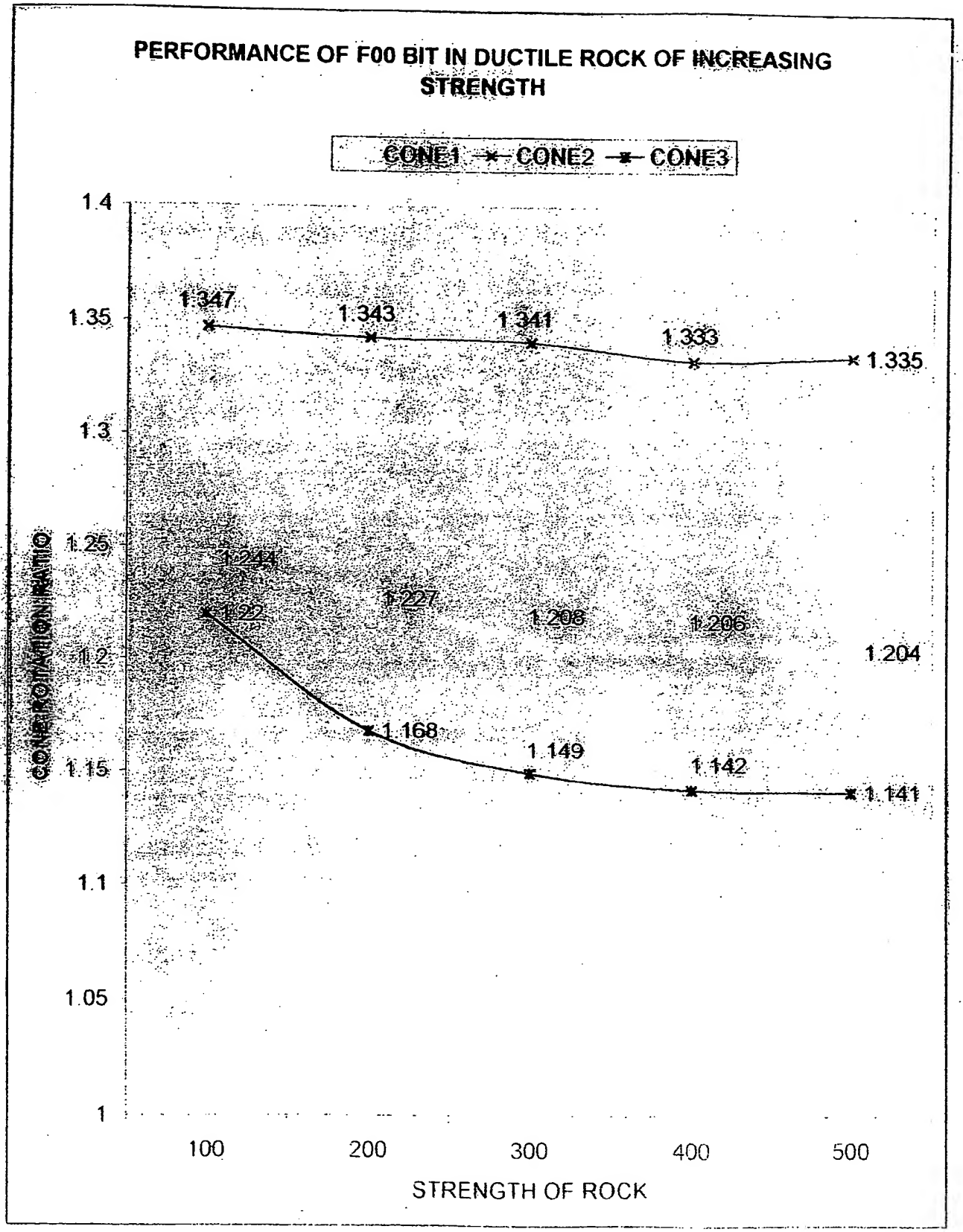
"window2" - ins_bend_0 - ins_bend_0


Stress XX (Top)
Max +1.871E+04
Min -8.513E+03
Original Model
Load: load1
+1.510E+04
+1.202E+04
+8.943E+03
+5.867E+03
+2.791E+03
-2.848E+02
-3.361E+03
-6.437E+03
"window1" - ins_band - ins_band
Stress YY (Top)
Max +2.048E+04
Min -1.273E+04
Original Model
Load: load1
+1.667E+04
+1.287E+04
+9.066E+03
+5.266E+03
+1.466E+03
-2.334E+03
-6.134E+03
-9.934E+03
"window2" - ins_iceaxe - ins_iceaxe
Stress Max Prin (Top)
Max +8.428E+04
Min -2.723E+03
Original Model
Load: load1
+8.343E+04
+7.266E+04
+6.189E+04
+5.112E+04
+4.035E+04
+2.958E+04
+1.881E+04
+8.037E+03
"window2" - ins_band - ins_band
Stress Max Prin (Top)
Max +1.588E+05
Min -5.489E+03
Original Model
Load: load1
+1.388E+05
+1.206E+05
+1.027E+05
+8.468E+04
+6.665E+04
+4.861E+04
+3.058E+04
+1.255E+04
Y
Z
X
"window1" - ins_iceaxe - ins_iceaxe

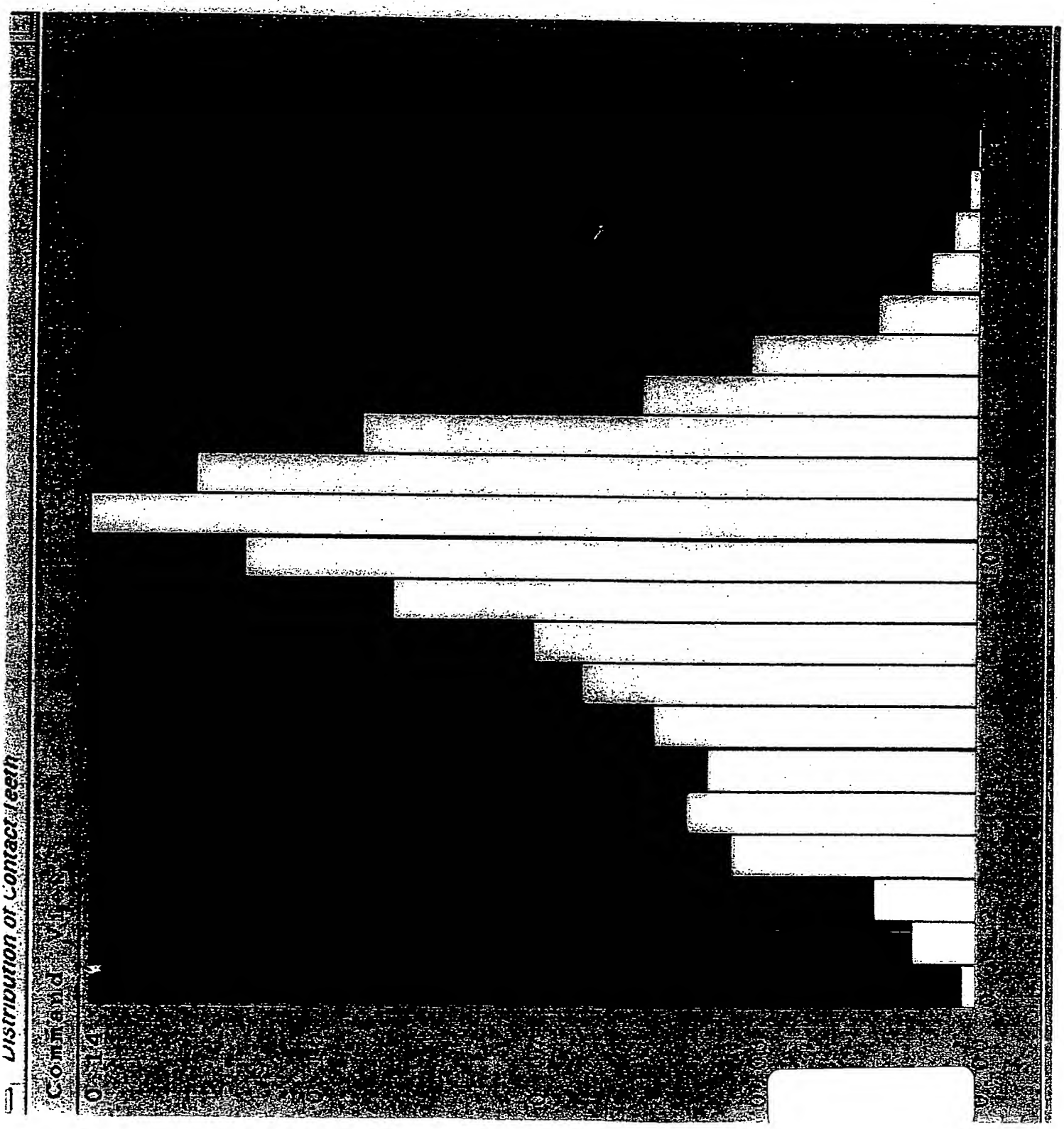

Stress ZZ (top)
Max +7.5239E+04
Min +2.1143E+04
Original Model
Load: load1
+6.275E+04
+5.226E+04
+4.178E+04
+3.129E+04
+2.080E+04
+1.032E+04
-1.699E+02
-1.066E+04
"Window2" - ino_iceban - ino_iceban
Stress ZZ (top)
Max +2.2807E+04
Min -1.9477E+04
Original Model
Load: load1
+1.801E+04
+1.333E+04
+8.839E+03
+3.953E+03
-7.327E+02
-5.419E+03
-1.010E+04
-1.479E+04
Z
"Window4" - ino_band - ino_band
Stress Max Prin (top)
Max +1.5883E+05
Min +5.4831E+03
Original Model
Load: load1
+1.388E+05
+1.208E+05
+1.027E+05
+8.468E+04
+6.665E+04
+4.861E+04
+3.058E+04
+1.255E+04
"Window1" - ino_iceban - ino_iceban
Stress Max Prin (top)
Max +9.4205E+04
Min -2.7238E+03
Original Model
Load: load1
+8.343E+04
+7.266E+04
+6.189E+04
+5.112E+04
+4.035E+04
+2.958E+04
+1.881E+04
+8.037E+03
"Window3" - ino_band - ino_band

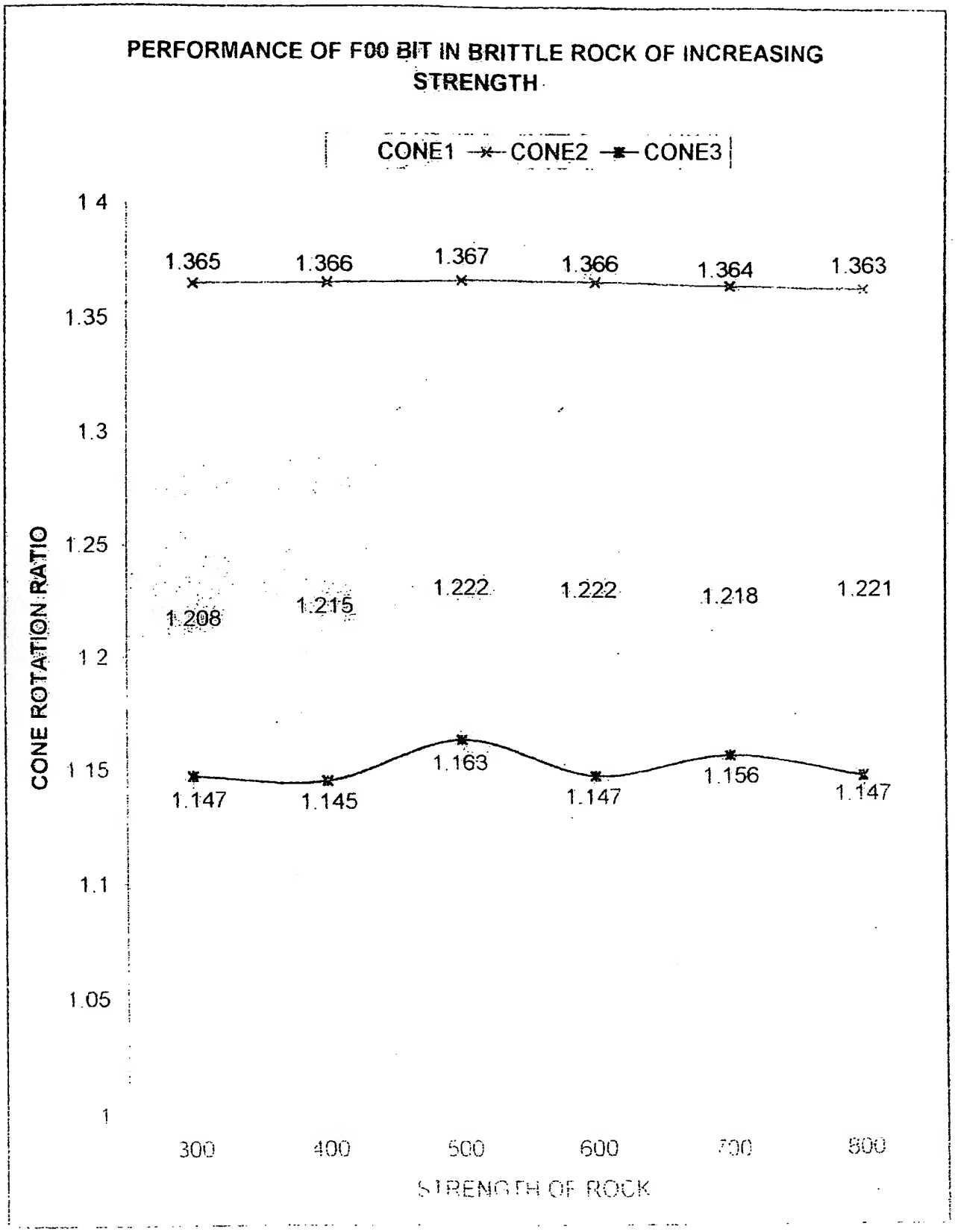


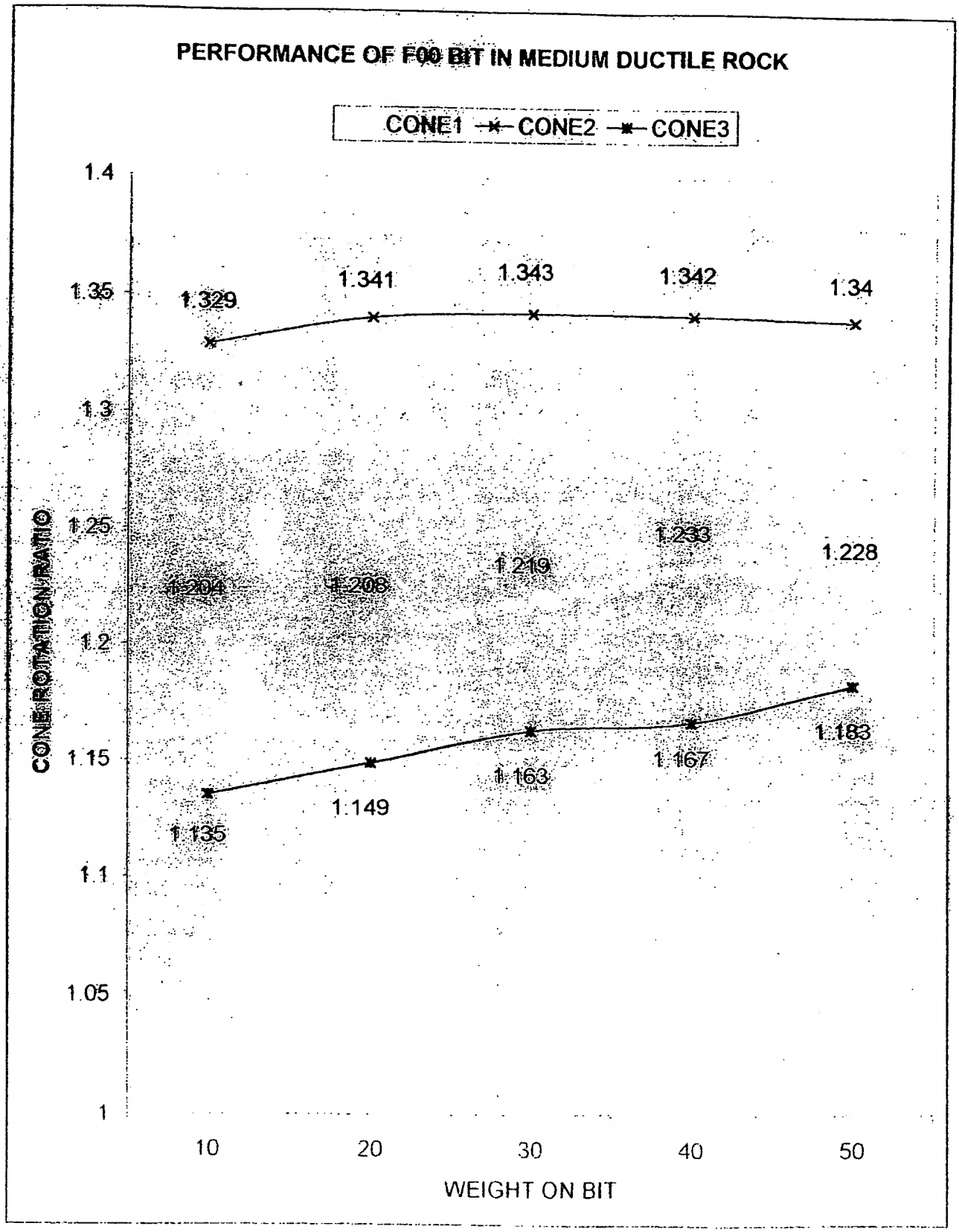


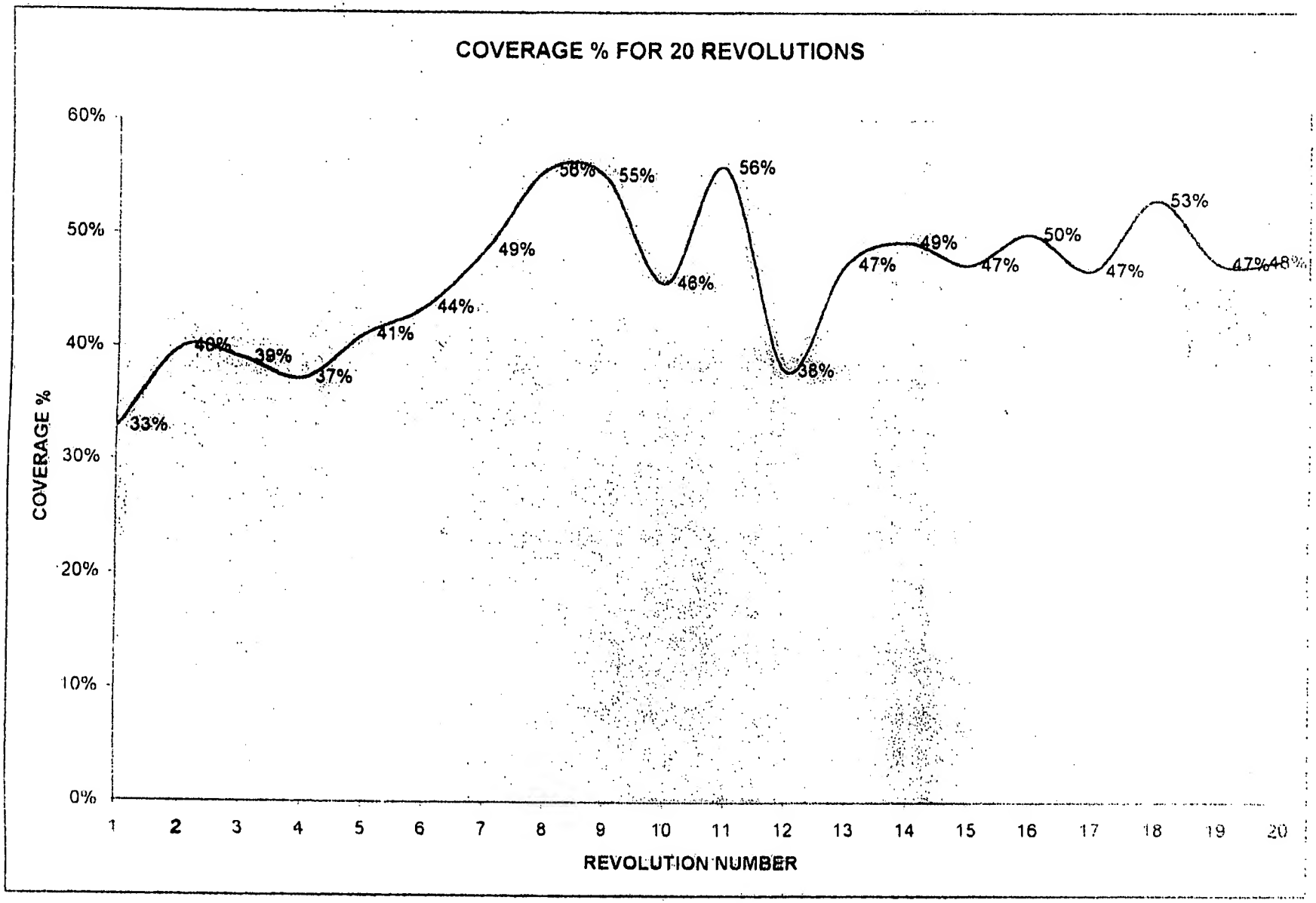

PERFORMANCE OF F00 BIT IN DUCTILE ROCK OF INCREASING STRENGTH
CONE1
CONE2
CONE3
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
1.347
1.343
1.341
1.333
1.335
1.244
1.227
1.208
1.206
1.204
1.22
1.168
1.149
1.142
1.141
100
200
300
400
500
STRENGTH OF ROCK

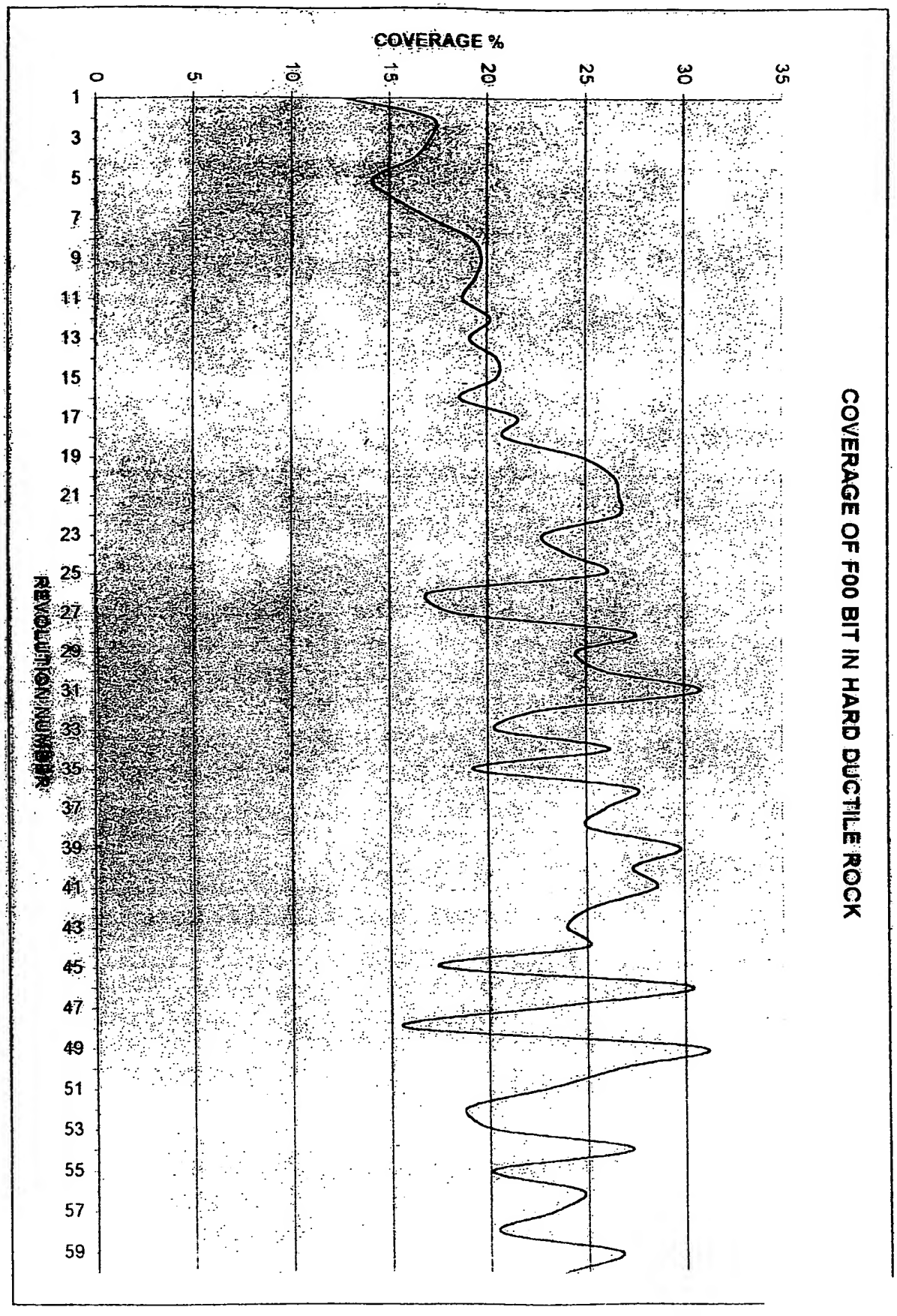
BIT TYPE:
ROCK: BRITTLE



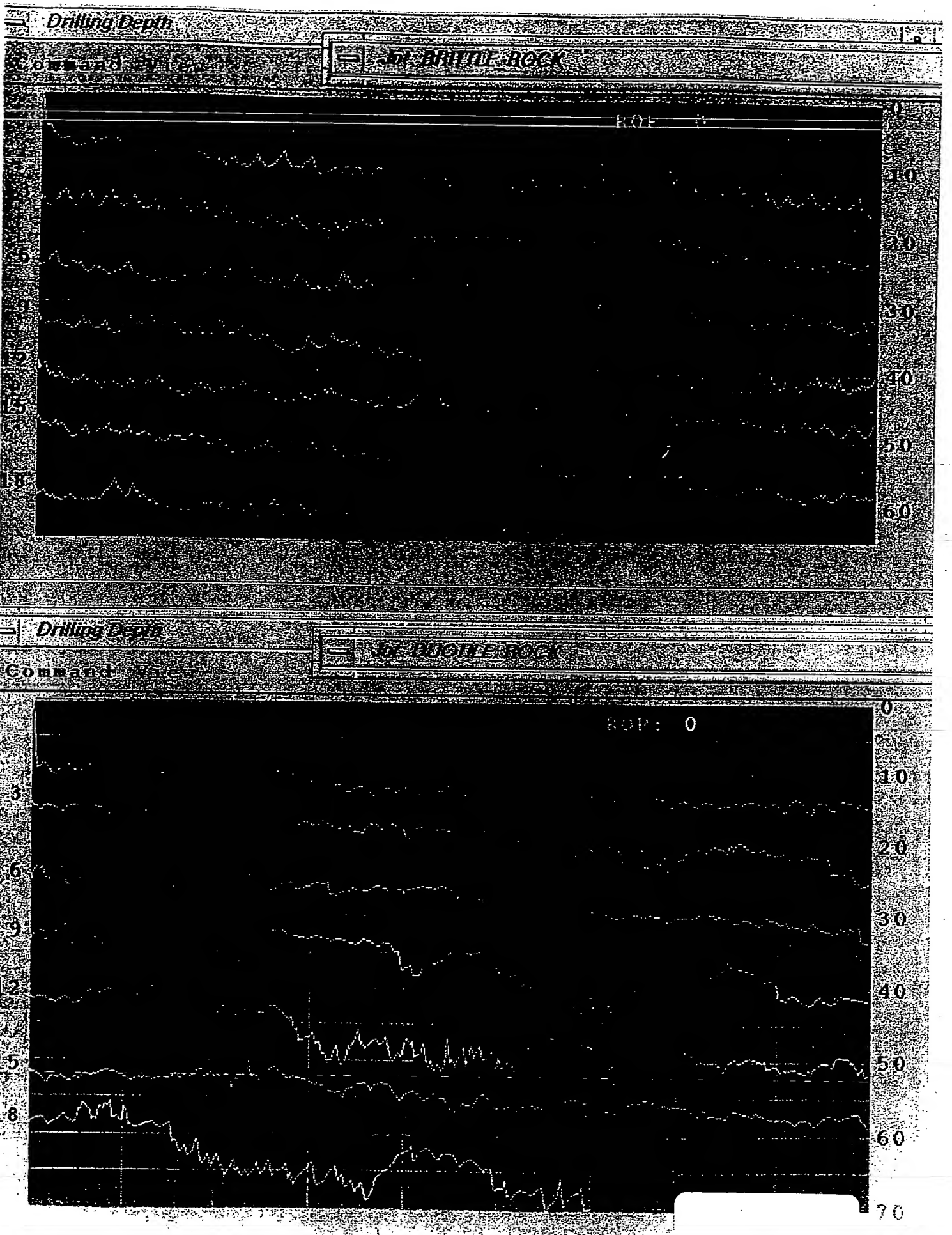

PERFORMANCE OF F00 BIT IN BRITTLE ROCK OF INCREASING STRENGTH
CONE1
CONE2
CONE3
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
CONE ROTATION RATIO
1.365
1.366
1.367
1.366
1.364
1.363
1.208
1.215
1.222
1.222
1.218
1.221
1.147
1.145
1.163
1.147
1.156
1.147
300
400
500
600
700
800
STRENGTH OF ROCK

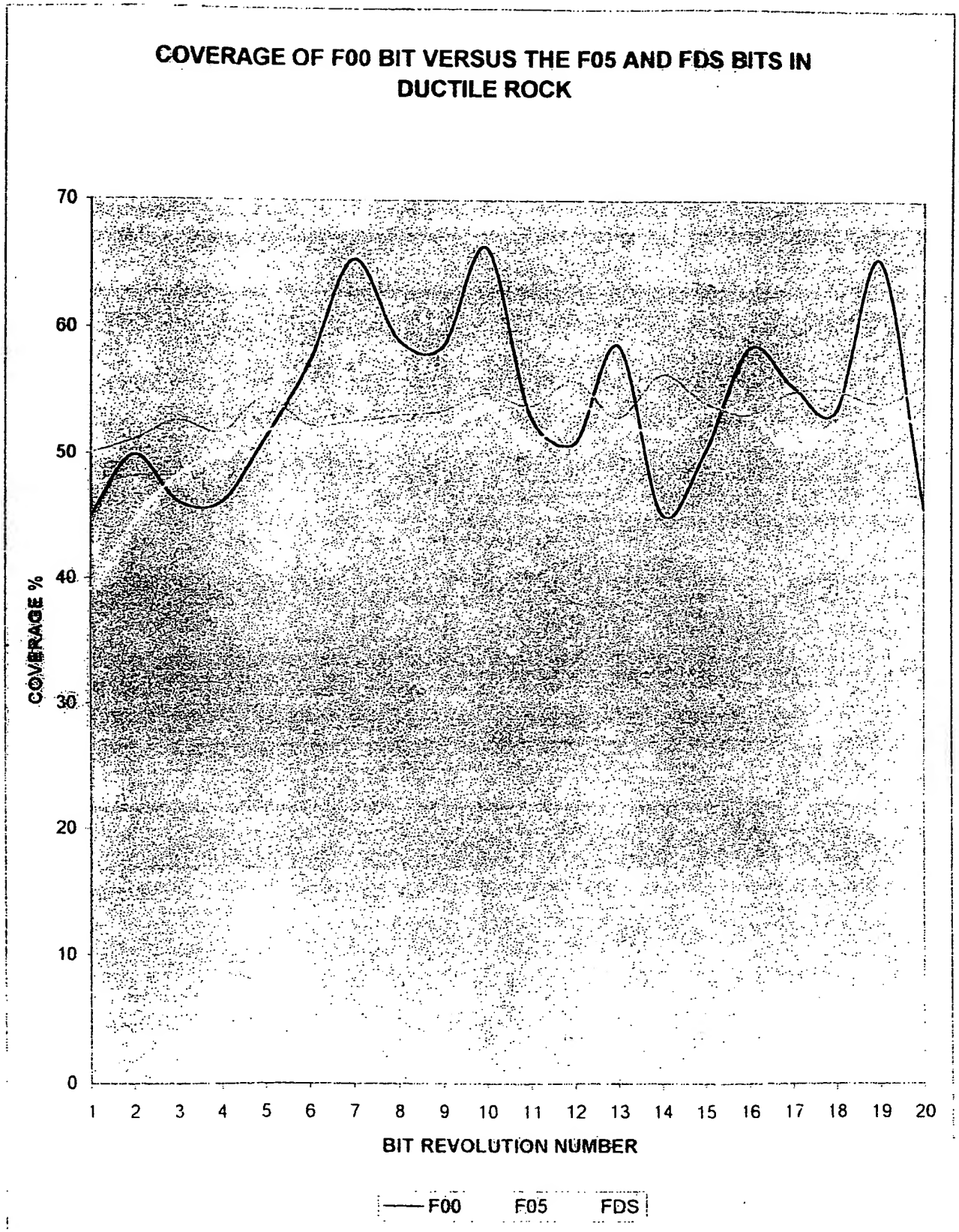

PERFORMANCE OF F00 BIT IN MEDIUM DUCTILE ROCK
CONE1
CONE2
CONE3
CONE ROTATION RATIO
1.4
1.35
1.3
1.25
1.2
1.15
1.1
1.05
1
1.329
1.341
1.343
1.342
1.34
1.204
1.208
1.219
1.233
1.228
1.135
1.149
1.163
1.167
1.183
10
20
30
40
50
WEIGHT ON BIT


COVERAGE % FOR 20 REVOLUTIONS
COVERAGE %
60%
50%
40%
30%
20%
10%
0%
33%
40%
39%
37%
41%
44%
49%
58%
55%
46%
56%
38%
47%
49%
47%
50%
47%
53%
47%
48%
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
REVOLUTION NUMBER

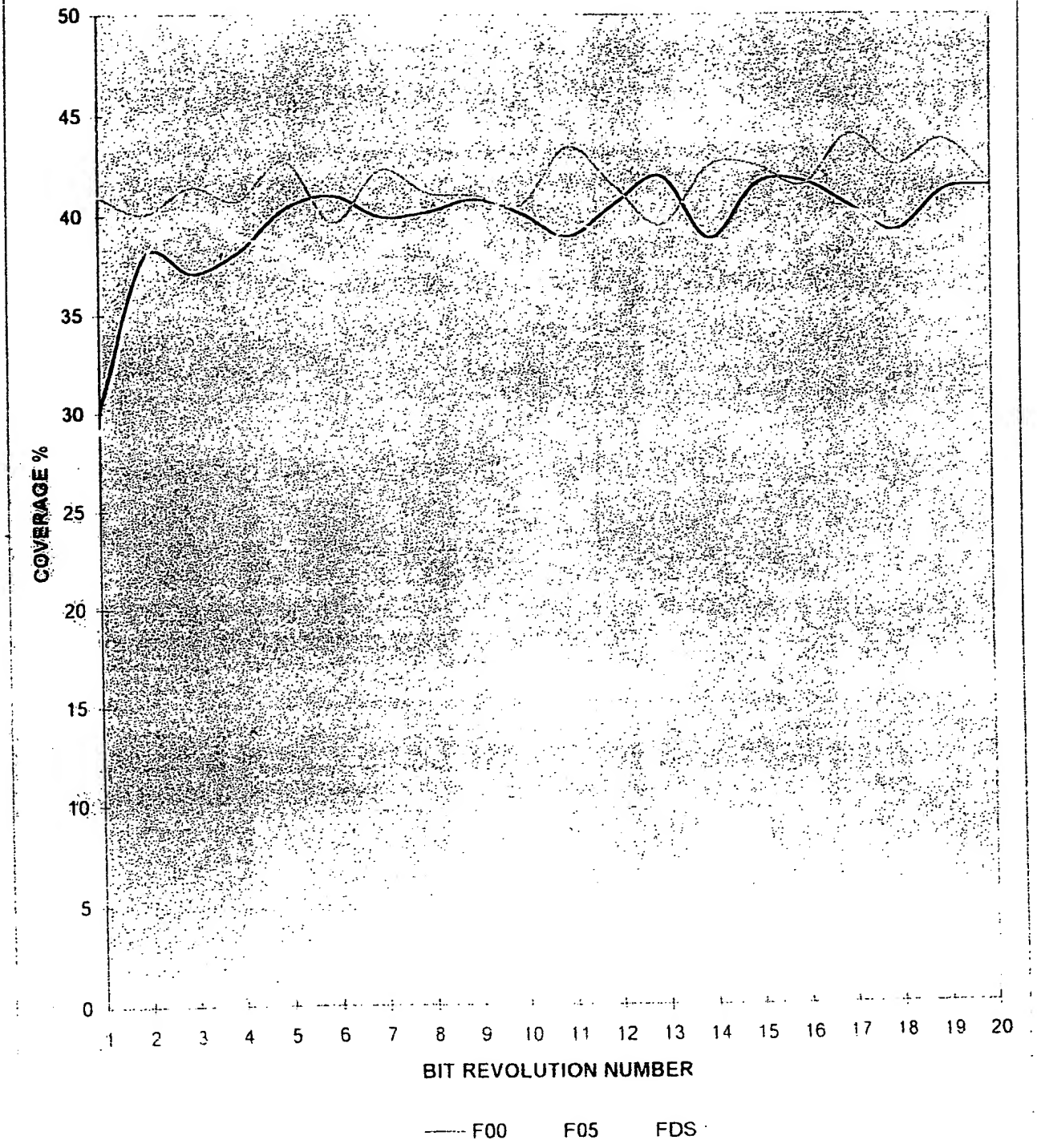
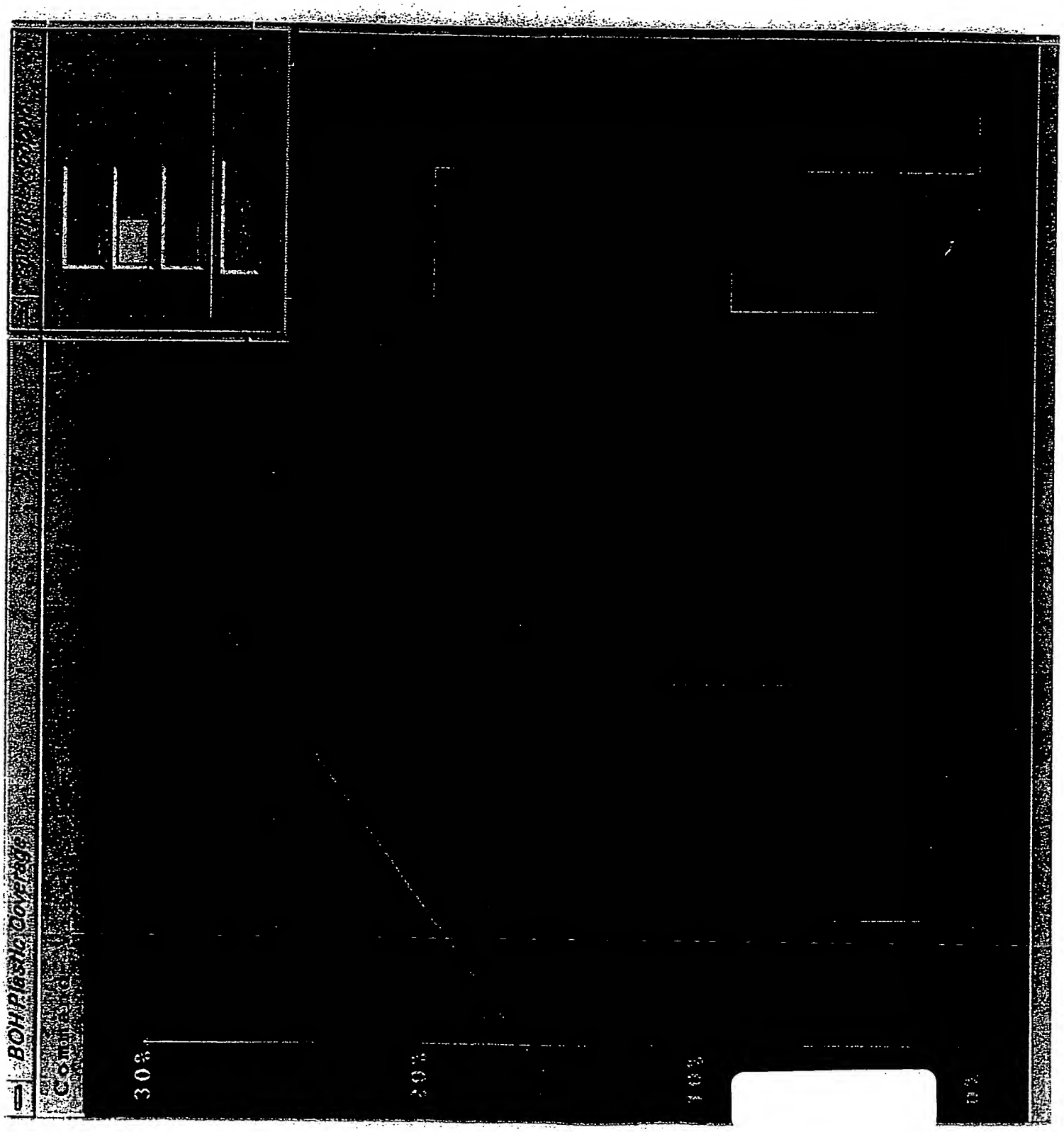


COVERAGE OF F00 BIT IN HARD DUCTILE ROCK


Drilling Depth
Command
Jet BRITTLE ROCK
BOP
0
10
20
30
40
50
60
Drilling Depth
Command
Jet DUCTILE ROCK
BOP: 0
0
10
20
30
40
50
60
70


COVERAGE OF F00 BIT VERSUS THE F05 AND FDS BITS IN DUCTILE ROCK
70
60
50
40
30
20
10
0
COVERAGE %
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
BIT REVOLUTION NUMBER
F00
F05
FDS

COVERAGE OF F00 BIT VERSUS THE F05 AND FDS BITS IN BRITTLE ROCK



BIT TYPE: *F00*
ROCK: ***BRITTLE***